**Institute for
Interlaboratory Studies**

Results of Proficiency Test
Naphtha P(IO)NA
April 2023

CONTENTS

Appendices:

1   INTRODUCTION

Since 1994 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Naphtha every year. During the annual proficiency testing program 2022/2023 it was decided to continue the Naphtha P(IO)NA round robin.

In this interlaboratory study 61 laboratories in 30 countries registered for participation, see appendix 2 for the number of participants per country. In this report the results of the Naphtha P(IO)NA 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.
It was decided to send one sample of Naphtha in a 30 mL amber glass bottle labelled #23044.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1   ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2   PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3   CONFIDENTIALITY STATEMENT

All data presented in this report must be regarded as confidential and for use by the participating companies only. Disclosure of the information in this report is only allowed by means of the entire report. Use of the contents of this report for third parties is only allowed by written permission of the Institute for Interlaboratory Studies. Disclosure of the identity of one or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

A batch of approximately 3 liters of Naphtha was selected. This batch was especially prepared for the GC analyzes. After homogenization 90 amber glass bottles of 30 mL were filled and labelled #23044.
The homogeneity of the subsamples was checked by determination of Methanol in accordance with ASTM D7423 on 8 stratified randomly selected subsamples.

	Methanol in mg/kg
sample #23044-1	49.1
sample #23044-2	51.0
sample #23044-3	50.0
sample #23044-4	50.0
sample #23044-5	48.7
sample #23044-6	51.8
sample #23044-7	51.1
sample #23044-8	51.9

Table 1: homogeneity test results of subsamples #23044

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.

	Methanol in mg/kg
r (observed)	3.3
reference test method	D7423:23
0.3 x R (reference test method)	4.0

Table 2: evaluation of the repeatability of subsamples #23044

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

To each of the participating laboratories one 30 mL bottle of Naphtha labelled #23044 was sent on March 8, 2023. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

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

2.6 ANALYZES

The participants were requested to determine: Acetone, DIPE (Diisopropylether), Ethyl Acetate, MEK (Methyl Ethyl Ketone), Methanol, Ethanol, MTBE (Methyl tertiary-Butyl Ether), TAME (tertiary-Amyl Methyl Ether), Total Oxygenates, PIONA GC Determination (Total Paraffins, n-Paraffins, i-Paraffins, Olefins, Aromatics, Naphthenes and C4 and lighter hydrocarbons) in %V/V and %M/M, PNA GC Determination (Total Paraffins, Total Naphthenes, Total Aromatics and C4 and lighter hydrocarbons) in %V/V and %M/M and Detail Hydrocarbon Analysis (DHA) (Pentane, Benzene, Cyclohexane, 2- and 3-Methylpentane, Heptane, Toluene and Octane).

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

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

3 RESULTS

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

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

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

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

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

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

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

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

3.2   GRAPHICS

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

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density

Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3   Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

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

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

4   EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Therefore, the reporting time on the data entry portal was extended with another two weeks. Six participants reported test results after the extended reporting date and nineteen other participants did not report any test results. Not all participants were able to report all tests requested.
In total 42 participants reported 720 numerical test results. Observed were 34 outlying test results which is 4.7%. 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 TEST

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

In the iis PT reports ASTM test methods are referred to with a number (e.g. D5443) and an added designation for the year that the test method was adopted or revised (e.g. D5443:23).

Oxygenates

Acetone: This determination may be problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation, nor with the strict requirements of ASTM D7423:23.
It was decided to evaluate against the estimated reproducibility calculated with the Horwitz equation because the requirements of ASTM D7423:23 is very strict.

DIPE: This determination may not be problematic. All reporting participants agreed on a concentration lower than 10 mg/kg. Therefore, no z-scores are calculated.

Ethyl Acetate: Only one participant reported a test result. Therefore, no z-scores are calculated.

MEK: This determination was very problematic. Five laboratories found values of less than 10 mg/kg, one laboratory found a value of 30 mg/kg while three laboratories found values of a few hundred mg/kg of MEK. As explained in report iis21N01 there could be a mix-up with Ethyl Acetate which is very close in the chromatogram and may have contributed to a false positive test result for MEK.
The remaining five laboratories agreed on a test value less than 10 mg/kg which is correct. However, because of the low value of MEK no z-scores are calculated.

Methanol: This determination was very problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of ASTM D7423:23. It was decided not to calculate z-scores due to a large variation over the group compared to the target reproducibility.

Ethanol: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of ASTM D7423:23.

MTBE: This determination was problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D7754:19, nor with the stricter requirements of ASTM D7423:23. The consensus value (751.517 mg/kg) is above the application range of MTBE in ASTM D7423:23 (0.5 – 100 mg/kg). Therefore, it was decided to evaluate the reported test results against the requirements of ASTM D7754:19 with an application range of 18 – 1717 mg/kg.

TAME: This determination was very problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirements of ASTM D7754:19, nor with the requirements of ASTM D7423:23.
The consensus value (382.59 mg/kg) is above the application range of TAME in ASTM D7423:23 (0.5 – 100 mg/kg). Therefore, it was decided to evaluate the reported test results against the requirements of ASTM D7754:19 with an application range of 13 – 1842 mg/kg.

Total Oxygenates: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the estimated reproducibility calculated with the Horwitz equation based on 5 components. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

PIONA %V/V
Total Paraffins: This determination was problematic. No statistical outliers were observed but two other test result were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D6839:21a.

n-Paraffins: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D6839:21a.

i-Paraffins: 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 ASTM D6839:21a.

Olefins: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D6839:21a.

Aromatics: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of ASTM D6839:21a.

Naphthenes: 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 ASTM D6839:21a.

C4 and lighter: This determination may be problematic because two groups are observed. No clear explanation is found as the bimodal distribution cannot be linked to the reported test methods. No statistical outliers were observed. Unfortunately, no requirements are given in ASTM D6839:21a. Therefore, no z-scores are calculated.

PIONA %M/M
No precision data is available for the determination of PIONA in %M/M. Therefore, no z-scores are calculated. The %M/M test results are given next to the PIONA %V/V test results in appendix 1.

PNA %V/V
No precision data is available for the determination of PNA in %V/V. Therefore, no z-scores are calculated. The %V/V test results are given next to the PNA %M/M test results in appendix 1.

PNA %M/M
Total Paraffins: 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 ASTM D5443:23.

Total Naphthenes: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not at all in agreement with the requirements of ASTM D5443:23.

Total Aromatics: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5443:23.

C4 and lighter: This determination may be problematic. No statistical outliers were observed. Unfortunately, no requirements are given in ASTM D5443:23. Therefore, no z-scores are calculated.

DHA
Pentane: 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 D5134:21.

Benzene: This determination may be problematic for a number of laboratories. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5134:21.

Cyclohexane: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirement of ASTM D5134:21.

2-Methylpentane: This determination may not be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation but not with the strict requirement of ASTM D5134:21.

3-Methylpentane: This determination may not be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation but not with the strict requirement of ASTM D5134:21.

Heptane: This determination may not be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation but not with the strict requirement of ASTM D5134:21.

Toluene: This determination may not be problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation but not with the strict requirement of ASTM D5134:21.

Octane: This determination was very problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not at all in agreement with the requirement of ASTM D5134:21 nor with the estimated reproducibility calculated with the Horwitz equation. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

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 table.

Parameter	unit	n	average	2.8 * sd	R(lit)
OXYGENATES					
Acetone	mg/kg	9	7.90	4.37	2.59
DIPE	mg/kg	9	<10	n.e.	n.e.
MEK	mg/kg	5	<10	n.e.	n.e.
Methanol	mg/kg	11	57.0	49.9	(14.2)
Ethanol	mg/kg	9	4.49	4.51	2.15
MTBE	mg/kg	7	752	228	159

Parameter	unit	n	average	2.8 * sd	R(lit)
TAME	mg/kg	11	383	70	32
Total Oxygenates	%M/M	7	0.72	0.55	(0.19)
PIONA					
Total Paraffins	%V/V	27	56.3	2.4	1.6
Total Paraffins	%M/M	27	53.3	2.6	n.a.
n-Paraffins	%V/V	28	22.5	2.2	1.6
n-Paraffins	%M/M	29	21.3	2.2	n.a.
i-Paraffins	%V/V	26	33.8	1.8	1.6
i-Paraffins	%M/M	26	32.0	1.8	n.a.
Olefins	%V/V	27	0.33	0.44	0.43
Olefins	%M/M	28	0.32	0.38	n.a.
Aromatics	%V/V	30	8.08	1.38	0.65
Aromatics	%M/M	31	9.50	1.56	n.a.
Naphthenes	%V/V	27	34.9	1.9	1.6
Naphthenes	%M/M	27	36.6	2.0	n.a.
C4 and lighter	%V/V	23	0.21	0.38	n.a.
C4 and lighter	%M/M	23	0.17	0.33	n.a.
PNA					
Total Paraffins	%V/V	11	56.4	1.9	n.a.
Total Paraffins	%M/M	8	53.6	1.4	1.2
Total Naphthenes	%V/V	11	35.3	1.9	n.a.
Total Naphthenes	%M/M	8	36.7	1.6	0.7
Total Aromatics	%V/V	11	8.10	0.78	n.a.
Total Aromatics	%M/M	12	9.43	0.80	0.86
C4 and lighter	%V/V	6	0.28	0.59	n.a.
C4 and lighter	%M/M	8	0.22	0.44	n.a.
DHA					
Pentane	%M/M	22	0.85	0.09	0.13
Benzene	%M/M	21	0.097	0.013	0.019
Cyclohexane	%M/M	21	2.19	0.14	0.24
2-Methylpentane	%M/M	21	1.70	0.16	0.18
3-Methylpentane	%M/M	21	1.31	0.10	0.14
Heptane	%M/M	21	4.23	0.27	0.38
Toluene	%M/M	21	1.08	0.05	0.12
Octane	%M/M	17	6.65	1.43	(0.47)

Table 3: reproducibilities of tests on sample #23044

For results between brackets no z-scores are calculated.

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

4.3   COMPARISON OF THE PROFICIENCY TEST OF APRIL 2023 WITH PREVIOUS PTS

	April 2023	April 2022	April 2021	April 2020	April 2019
Number of reporting laboratories	42	50	56	74	93
Number of test results	720	948	1052	1446	1635
Number of statistical outliers	34	52	73	130	73
Percentage of statistical outliers	4.7%	5.5%	6.9%	9.0%	4.5%

Table 4: 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.

Parameter	April 2023	April 2022	April 2021	April 2020	April 2019
Oxygenates	--	-	-	-	-
PIONA *)	-	+	+/-	+	-
PNA *)	-	+	+	+	n.e.
DHA	+	+	-	-	+

Table 5: comparison of determinations to the reference test methods

*) Up till 2019 PIONA and PNA was combined evaluated in the PT

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 Acetone on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	9.6		1.84	
311	INH-403/A	8.6		0.76	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	6.7		-1.29	
754		-----		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	6.8	C	-1.18	First reported 1.6
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	7.99		0.10	
994		-----		-----	
1012		-----		-----	
1026	D7423	10.7972		3.14	
1039		-----		-----	
1062	D7423	7.65		-0.26	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857		-----		-----	
1862		-----		-----	
1950		-----		-----	
1982	D7754	7.1		-0.86	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	5.82		-2.24	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	OK
n	9
outliers	0
mean (n)	7.895
st.dev. (n)	1.5597
R(calc.)	4.367
st.dev.(Horwitz)	0.9256
R(Horwitz)	2.592
Compare	
R(D7423:23)	1.524
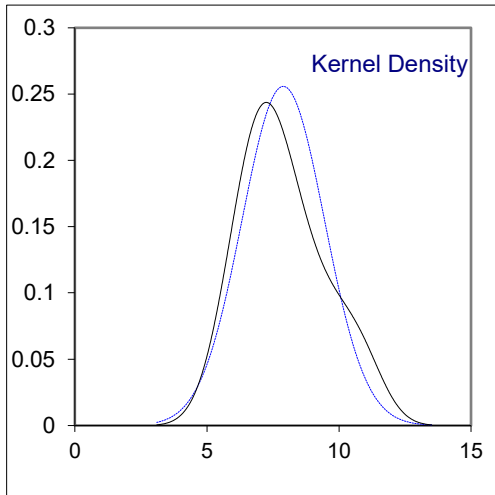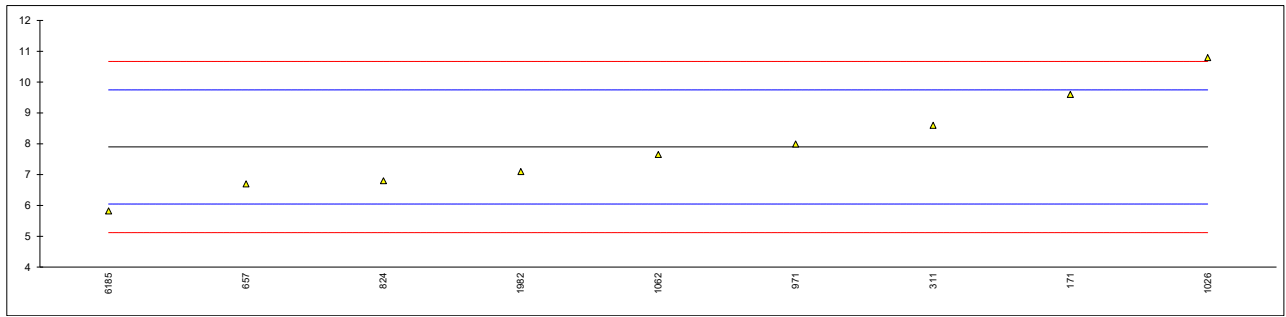
Determination of DIPE on sample #23044; results in mg/kg

lab	Method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	5.6		-----	
311	INH-403/A	<1		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	<1		-----	
754		-----		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	<0.5		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	<0.5		-----	
994		-----		-----	
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062	D7423	0		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D7754	<10		-----	
1862		-----		-----	
1950		-----		-----	
1982	D7754	0.6		-----	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	6.82		-----	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	N	9			
	mean (n)	<10			

Determination of Ethyl Acetate on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171		-----		-----	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657		-----		-----	
754		-----		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971		-----		-----	
994		-----		-----	
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857		-----		-----	
1862		-----		-----	
1950		-----		-----	
1982		-----		-----	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	3535.83		-----	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

Determination of MEK on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	<0.5		-----	
311	INH-403/A	<1		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	30		-----	Possibly a false positive test result?
754		-----		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	<0.5	C	-----	First reported 2.7
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	<0.5		-----	
994		-----		-----	
1012		-----		-----	
1026	D7423	2668.614		-----	Possibly a false positive test result?
1039		-----		-----	
1062	D7423	2088.31		-----	Possibly a false positive test result?
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857		-----		-----	
1862		-----		-----	
1950		-----		-----	
1982	D7754	2420		-----	Possibly a false positive test result?
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	0		-----	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	n	5			
	mean (n)	<10			

Determination of Methanol on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	62.6		-----	
311	INH-403/A	48.0		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	38.7		-----	
754	D7754	53		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	44.9	C	-----	First reported 1.8
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	70.46		-----	
994		-----		-----	
1012		-----		-----	
1026	D7423	407.0	C,G(0.01)	-----	First reported 3.6964
1039		-----		-----	
1062	D7423	39.06		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D7754	94		-----	
1862		-----		-----	
1950	D7754	80		-----	
1982	D7754	48.6		-----	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	47.53		-----	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	suspect	
n	11	
outliers	1	
mean (n)	56.986	
st.dev. (n)	17.8071	
R(calc.)	49.860	
st.dev.(D7423:23)	(5.0727)	
R(D7423:23)	(14.204)	
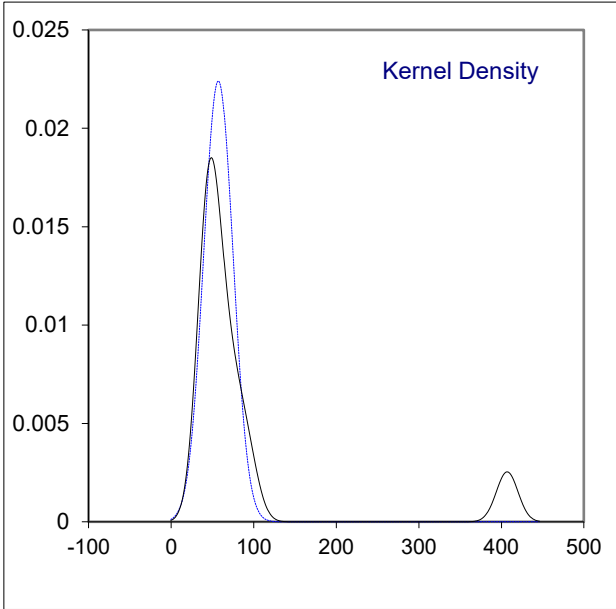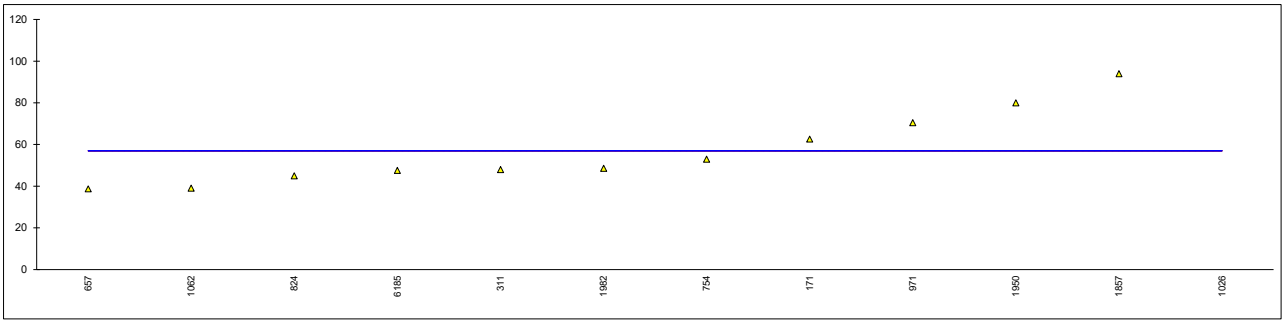
Determination of Ethanol on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	5.9		1.84	
311	INH-403/A	4.0		-0.64	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	4.1		-0.51	
754		-----		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	4.4	C	-0.12	First reported 3.8
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	3.88		-0.80	
994		-----		-----	
1012		-----		-----	
1026	D7423	7.5153		3.94	
1039		-----		-----	
1062	D7423	2.28		-2.88	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D7754	10	DG(0.01)	7.18	
1862		-----		-----	
1950	D7754	10	DG(0.01)	7.18	
1982	D7754	2.8		-2.21	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	5.55		1.38	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	OK
n	9
outliers	2
mean (n)	4.492
st.dev. (n)	1.6115
R(calc.)	4.512
st.dev.(D7423:23)	0.7672
R(D7423:23)	2.148
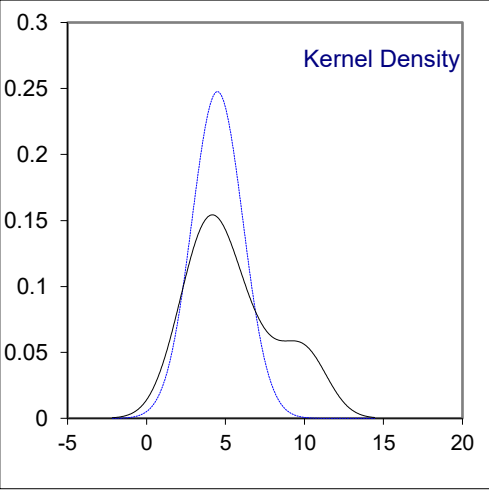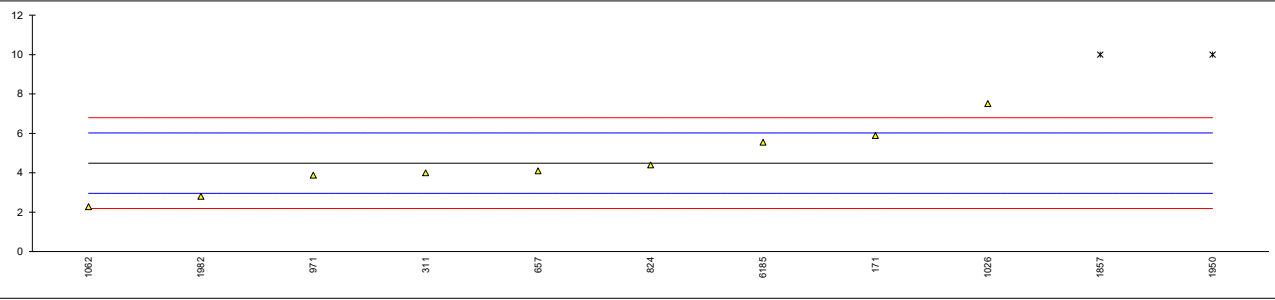
Determination of MTBE on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	744.2		-0.13	
311	INH-403/A	>100		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360	D7423	> 100		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	>500		-----	
754	D7754	776		0.43	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	1156.3	C,G(0.05)	7.12	First reported 32.7
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	582		-2.98	
994		-----		-----	
1012		-----		-----	
1026	D7423	844.5165		1.64	
1039		-----		-----	
1062	D7423	3292.03	G(0.01)	44.70	
1065		-----		-----	
1081		43	G(0.05)	-12.47	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538	UOP960	>250		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D7754	767		0.27	
1862		-----		-----	
1950	D7754	790		0.68	
1982	D7754	756.9		0.09	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	1209.43	G(0.05)	8.06	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

	normality	not OK	
	n	7	
	outliers	4	
	mean (n)	751.517	
	st.dev. (n)	81.4325	
	R(calc.)	228.011	
	st.dev.(D7754:19)	56.8315	
	R(D7754:19)	159.128	Range 18 – 1717 mg/kg
Compare			
	R(D7423:23)	148.586	Range 0.5 – 100 mg/kg

Kernel Density
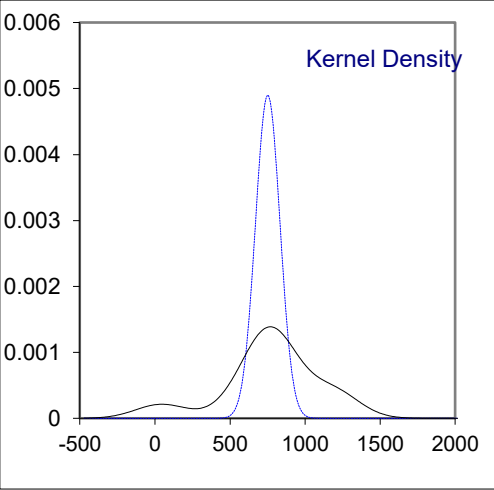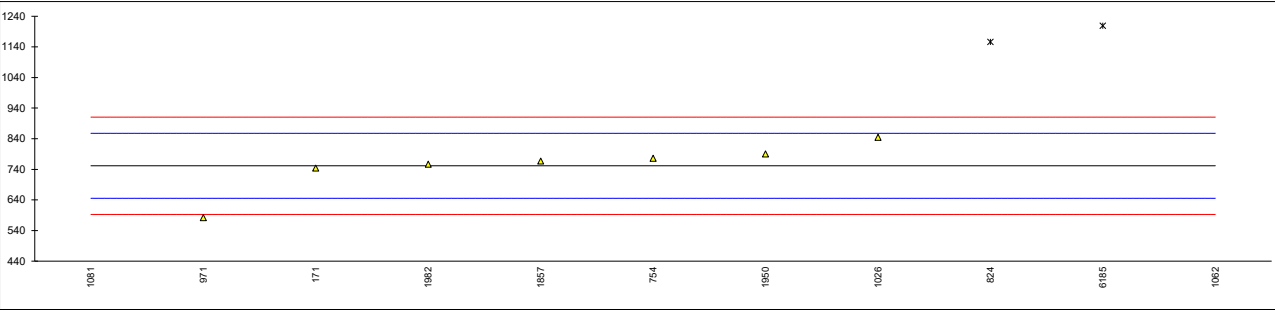
Determination of TAME on sample #23044; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	405.1		1.99	
311	INH-403/A	>100		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	375.8		-0.60	
754	D7754	402		1.71	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824	D7423	384.5	C	0.17	First reported 1.7
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	360		-2.00	
994		-----		-----	
1012		-----		-----	
1026	D7423	396.3155		1.21	
1039		-----		-----	
1062	D7423	335.42		-4.17	
1065		-----		-----	
1081		2	G(0.01)	-33.63	Possibly a false negative test result?
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538	UOP960	>250		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D7754	378		-0.41	
1862		-----		-----	
1950	D7754	428		4.01	
1982	D7754	374.3		-0.73	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	369.05		-1.20	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

	normality	OK	
	n	11	
	outliers	1	
	mean (n)	382.590	
	st.dev. (n)	24.8839	
	R(calc.)	69.675	
	st.dev.(D7754:19)	11.3182	
	R(D7754:19)	31.691	Range 13 – 1842 mg/kg
compare			
	R(D7423:23)	10.804	Range 0.5 – 100 mg/kg
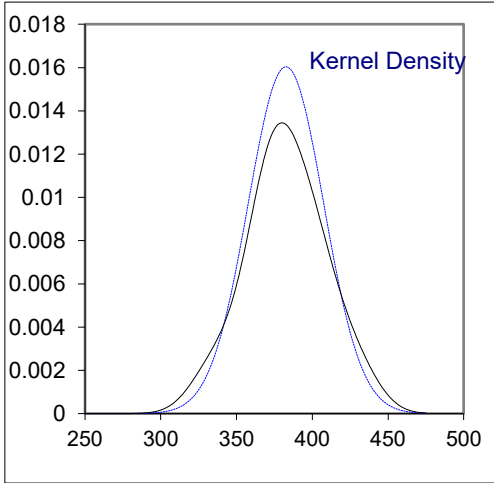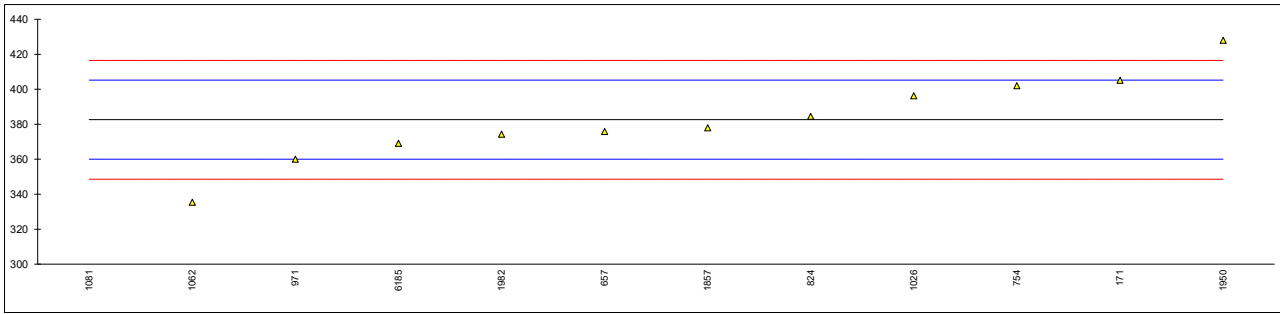
Determination of Total Oxygenates on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D7423	0.78	C	-----	First reported 7751.3 %M/M
311	INH-403/A	>0.1000	C	-----	First reported >1000 %M/M
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444		-----		-----	
445		-----		-----	
657	INH-0130	>0.05		-----	
754	D7754	0.5122		-----	
779		-----		-----	
781		-----		-----	
785		-----		-----	
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873		-----		-----	
874		-----		-----	
875		-----		-----	
876		-----		-----	
914		-----		-----	
922		-----		-----	
971	D7423	0.459		-----	
994		-----		-----	
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062	D7423	0.6618	C	-----	First reported 6618.09 %M/M
1065		-----		-----	
1081		1.04		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677		-----		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857		-----		-----	
1862		-----		-----	
1950		-----		-----	
1982	D7754	0.7289		-----	
1995		-----		-----	
6028		-----		-----	
6134		-----		-----	
6185	D7754	0.8282		-----	
6198		-----		-----	
6200		-----		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	unknown	
n	7	
outliers	0	
mean (n)	0.71573	
st.dev. (n)	0.196786	
R(calc.)	0.55100	
st.dev.(Horwitz 5 comp.)	(0.067322)	
R(Horwitz 5 comp.)	(0.18850)	
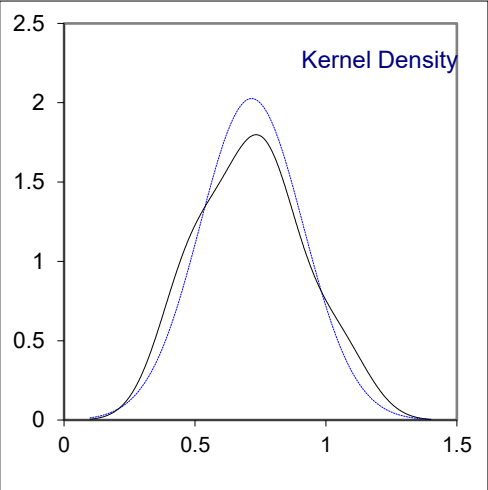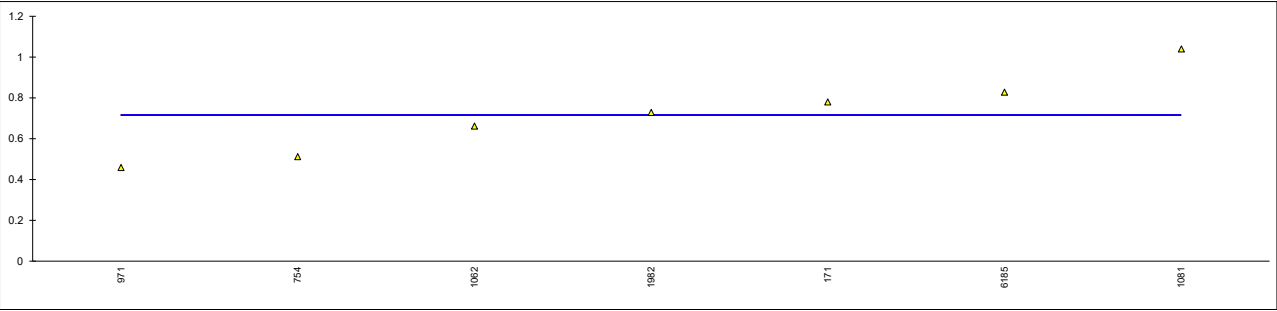
Determination of PIONA - Total Paraffins on sample #23044; results in %V/V and %M/M

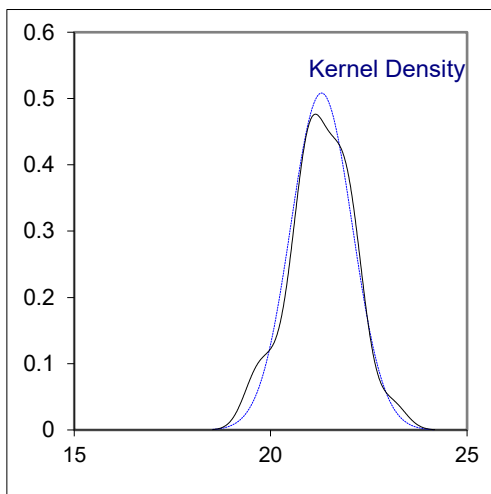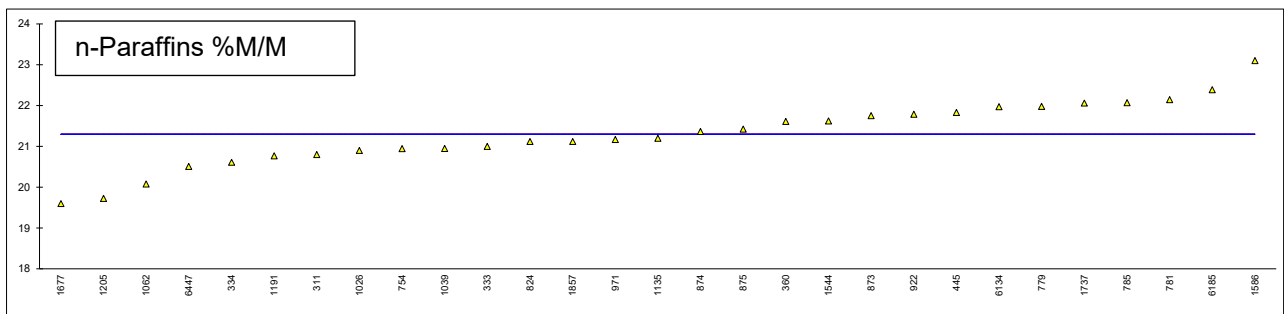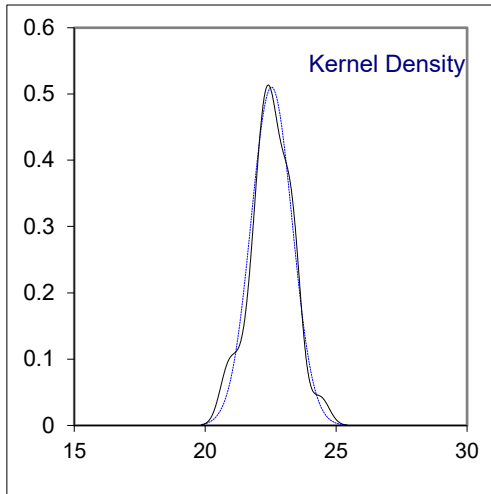| lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171	D6839	55.4		-1.63	52.4		
311	D5443Mod.	55.9		-0.75	52.7		
323		-----		-----	-----		
333	D6839	55.9		-0.75	52.7		
334	ISO22854-A	56.69		0.63	53.62		
349		-----		-----	-----		
360	D5443	-----		-----	53.48		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	56.25		-0.14	53.18		
657		-----		-----	-----		
754	D6729	56.566		0.41	53.680		
779	D6729	57.568		2.17	54.365		
781	D6729	57.621		2.26	54.740		
785	D6729	58.1771	C	3.23	55.1927	C	fr. 59.2239 and 56.2471
798		-----		-----	-----		
824	D6839	56.07		-0.45	52.97		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	57.182		1.49	54.342		
874	D6729	56.879		0.96	53.857		
875	D6729	56.827		0.87	54.003		
876		-----		-----	-----		
914		-----		-----	-----		
922	D6730	56.349		0.03	53.488		
971	D6839	55.97		-0.63	52.82		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	55.91		-0.73	52.74		
1039	ISO22854-A	55.94		-0.68	52.82		
1062	D6839	55.46		-1.52	52.24		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	54.9		-2.50	51.6		
1191	ISO22854-A	55.24		-1.91	52.09		
1205	D8071	57.289	ex	1.68	54.432	ex	*)
1538		-----		-----	-----		
1544	D5134	56.925		1.04	53.930		
1586	D6839	57.71	C	2.42	54.38	C	fr. 62.1 and 58.7
1656		-----		-----	-----		
1677	D6839	55.5		-1.45	52.44		
1720		-----		-----	-----		
1737	In house	56.68		0.61	53.64		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	56.32		-0.02	53.34		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	56.34		0.02	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	-----		
6185	In house	66.95	ex	18.59	64.11	ex	*)
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	54.61		-3.01	51.52		
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	27			27		
	outliers	0+2ex			0+2ex		
	mean (n)	56.3290			53.2696		
	st.dev. (n)	0.87390			0.92951		
	R(calc.)	2.4469			2.6026		
	st.dev.(D6839:21a)	0.57143			n.a.		
	R(D6839:21a)	1.6			n.a.		

*) test result excluded from statistical evaluation as statistical outlier in related parameter

Total Paraffins %V/V

Kernel Density

Total Paraffins %M/M

Kernel Density
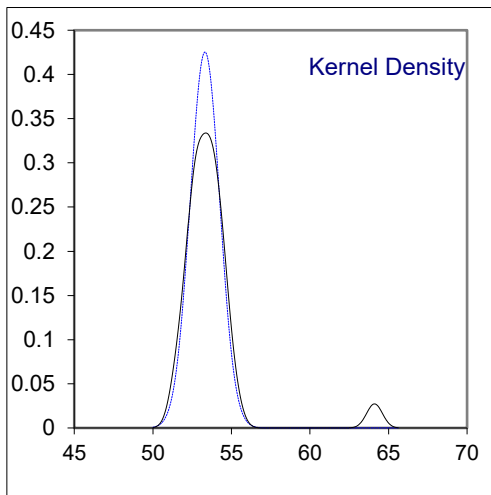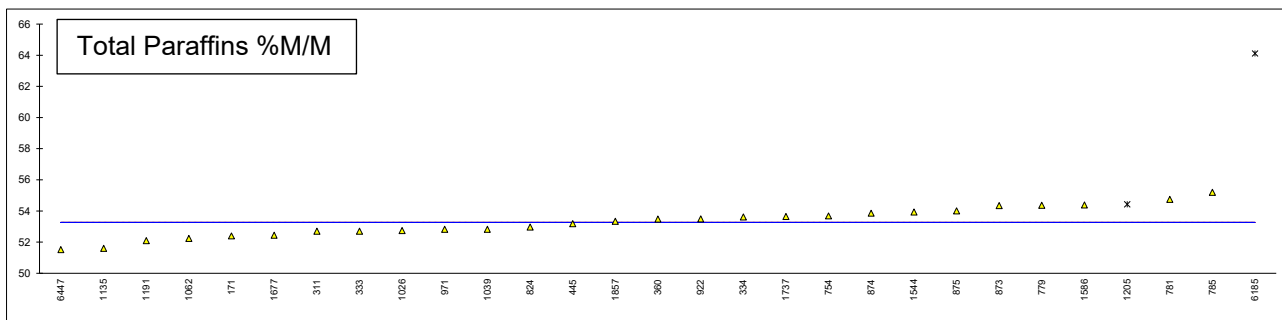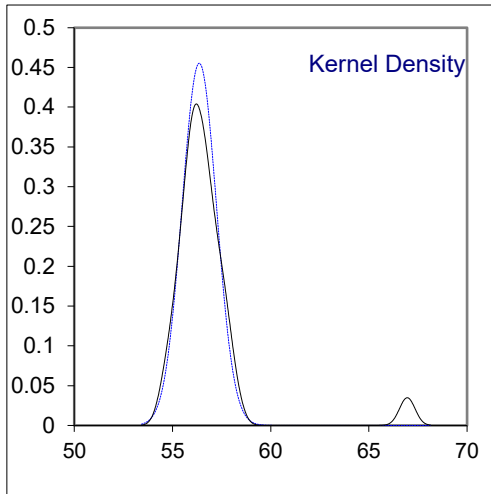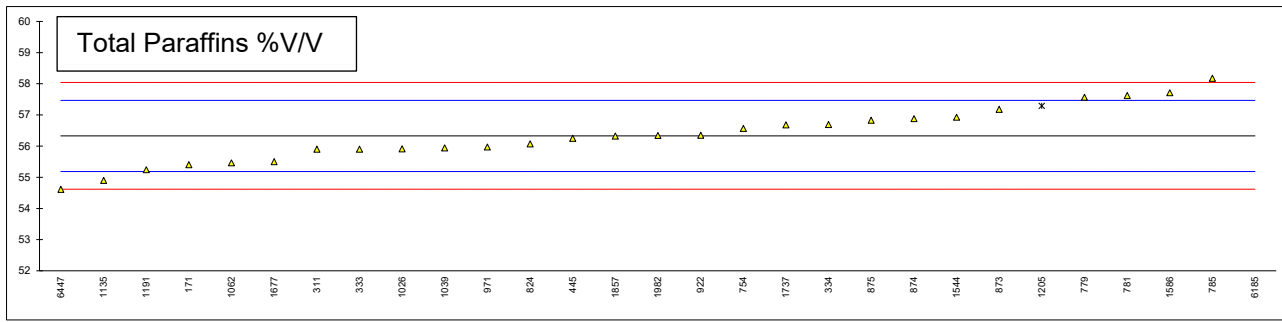
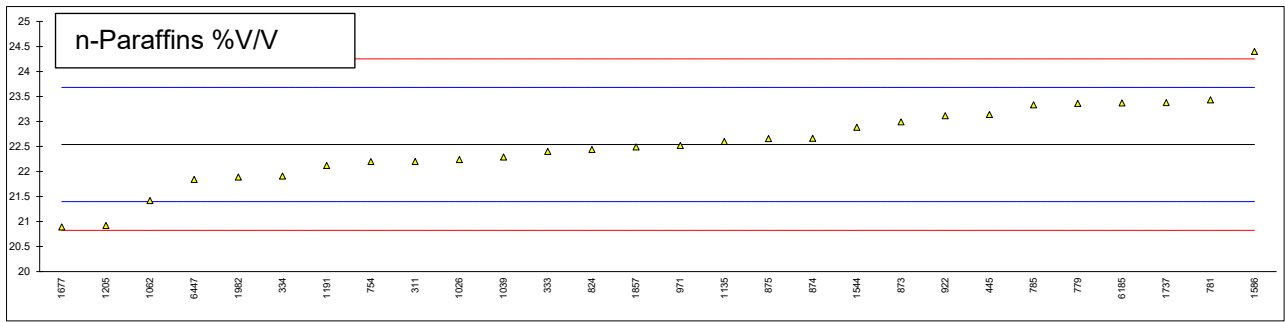## Determination of PIONA - n-Paraffins on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----			
171		-----		-----	-----		
311	D5443Mod.	22.2		-0.59	20.8		
323		-----		-----	-----		
333	D6839	22.4		-0.24	21.0		
334	ISO22854-A	21.91		-1.10	20.61		
349		-----		-----	-----		
360		-----		-----	21.61		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	23.14		1.05	21.83		
657		-----		-----	-----		
754	D6729	22.197		-0.60	20.946		
779	D6729	23.361		1.44	21.978		
781	D6729	23.434		1.57	22.145		
785	D6729	23.3318	C	1.39	22.0714	C	fr. 24.3046 and 23.0170
798		-----		-----	-----		
824	D6839	22.44		-0.17	21.12		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	22.992		0.79	21.752		
874	D6729	22.662		0.22	21.365		
875	D6729	22.657		0.21	21.422		
876		-----		-----	-----		
914		-----		-----	-----		
922	D6730	23.115		1.01	21.788		
971	D6839	22.52		-0.03	21.17		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	22.24		-0.52	20.90		
1039	ISO22854-A	22.29		-0.44	20.95		
1062	D6839	21.42		-1.96	20.08		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	22.6		0.11	21.2		
1191	ISO22854-A	22.12		-0.73	20.77		
1205	D8071	20.919		-2.84	19.726		
1538		-----		-----	-----		
1544	D5134	22.885		0.61	21.620		
1586	D6839	24.4		3.26	23.1		
1656		-----		-----	-----		
1677	D6839	20.89		-2.89	19.60		
1720		-----		-----	-----		
1737	In house	23.38		1.47	22.06		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	22.49		-0.09	21.12		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	21.89		-1.14	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	21.97		
6185	In house	23.37		1.45	22.39		
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	21.84		-1.22	20.51		
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	28			29		
	outliers	0			0		
	mean (n)	22.5391			21.2967		
	st.dev. (n)	0.78195			0.78469		
	R(calc.)	2.1895			2.1971		
	st.dev.(D6839:21a)	0.57143			n.a.		
	R(D6839:21a)	1.6			n.a.		

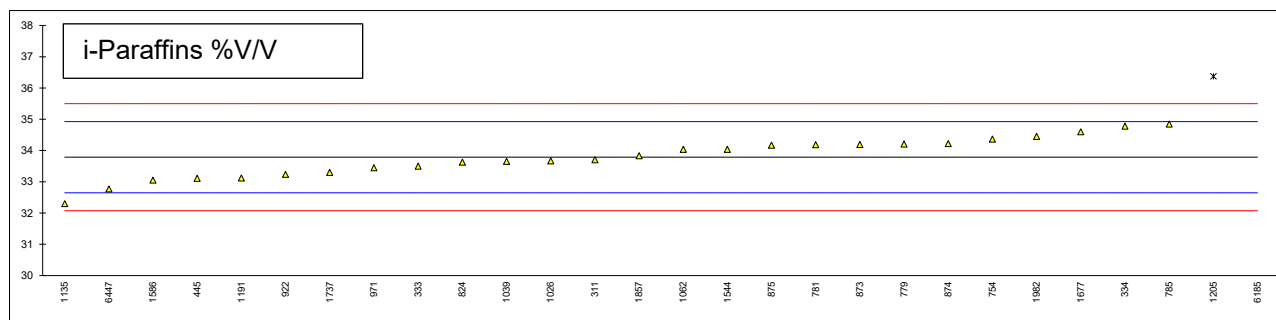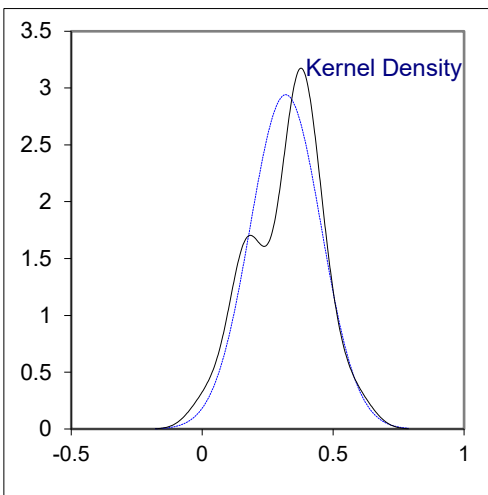## Determination of PIONA - i-Paraffins on sample #23044; results in %V/V and %M/M

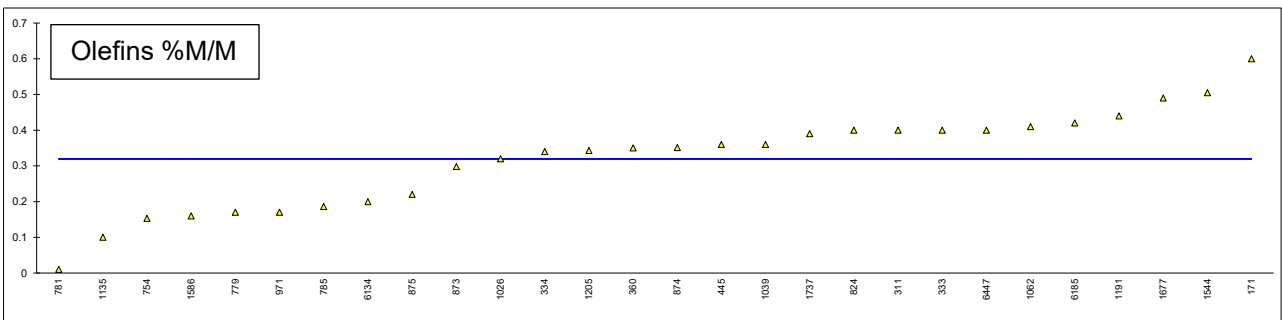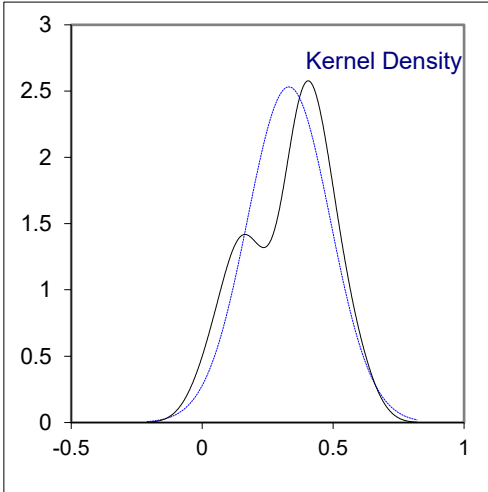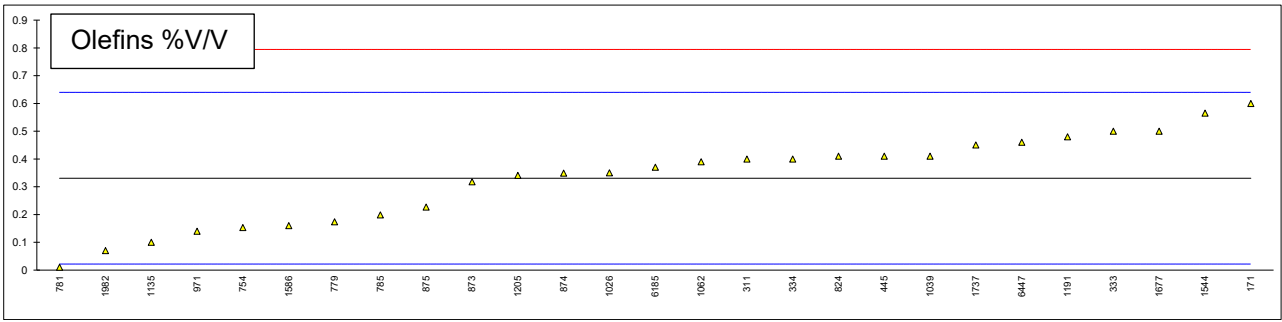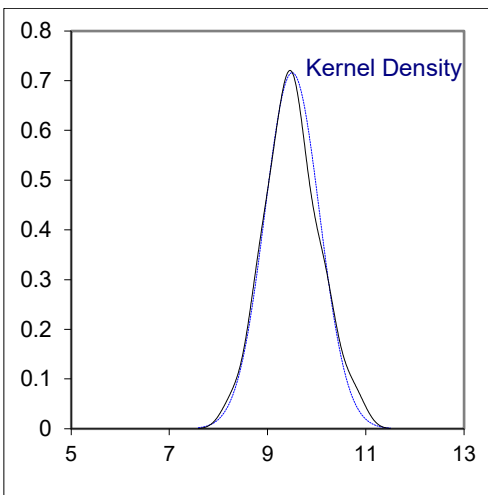| lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171		-----		-----	-----		
311	D5443Mod.	33.7		-0.15	31.9		
323		-----		-----	-----		
333	D6839	33.5		-0.50	31.7		
334	ISO22854-A	34.78		1.74	33.01		
349		-----		-----	-----		
360		-----		-----	31.87		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	33.11		-1.18	31.35		
657		-----		-----	-----		
754	D6729	34.369		1.02	32.734		
779	D6729	34.207		0.74	32.387		
781	D6729	34.187		0.70	32.595		
785	D6729	34.8453	C	1.86	33.1213	C	fr. 34.9193 and 33.2301
798		-----		-----	-----		
824	D6839	33.63		-0.27	31.85		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	34.190		0.71	32.590		
874	D6729	34.217		0.76	32.492		
875	D6729	34.170		0.67	32.581		
876		-----		-----	-----		
914		-----		-----	-----		
922	D6730	33.234		-0.96	31.700		
971	D6839	33.45		-0.59	31.65		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	33.67		-0.20	31.84		
1039	ISO22854-A	33.65		-0.24	31.87		
1062	D6839	34.04		0.45	32.16		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	32.3		-2.60	30.4		
1191	ISO22854-A	33.12		-1.16	31.32		
1205	D8071	36.370	R(0.05)	4.52	36.937	R(0.01)	
1538		-----		-----	-----		
1544	D5134	34.040		0.45	32.310		
1586	D6839	33.05	C	-1.29	31.55	C	fr. 37.7 and 35.6
1656		-----		-----	-----		
1677	D6839	34.60		1.43	32.84		
1720		-----		-----	-----		
1737	In house	33.30		-0.85	31.58		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	33.83		0.08	32.22		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	34.45		1.16	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	-----		
6185	In house	43.58	R(0.01)	17.14	41.72	R(0.01)	
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	32.77		-1.78	31.01		
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	26			26		
	outliers	2			2		
	mean (n)	33.7850			32.0242		
	st.dev. (n)	0.63248			0.64207		
	R(calc.)	1.7710			1.7978		
	st.dev.(D6839:21a)	0.57143			n.a.		
	R(D6839:21a)	1.6			n.a.		
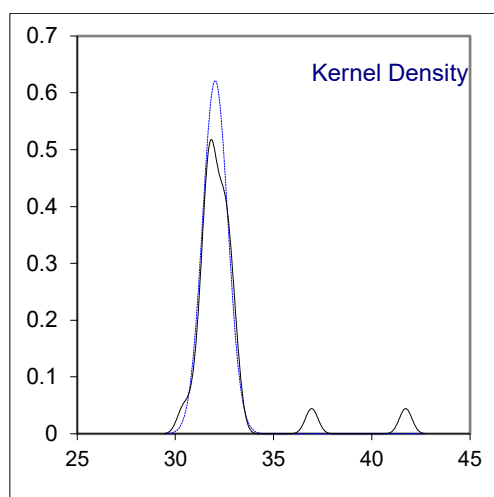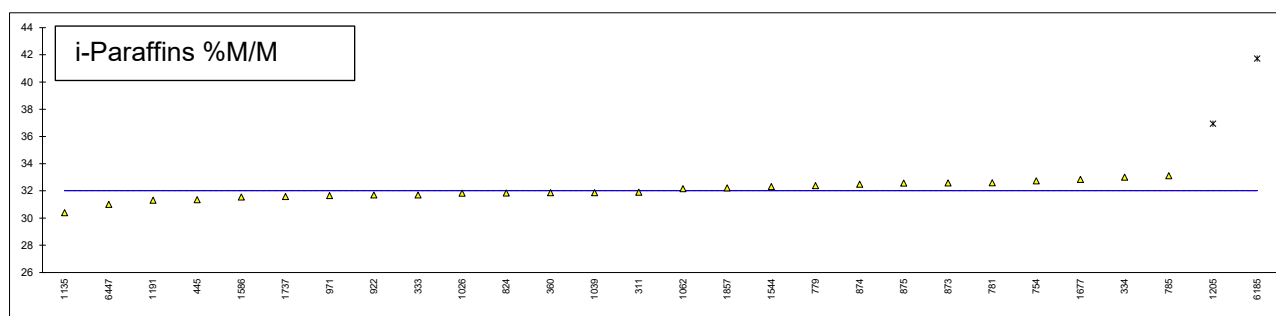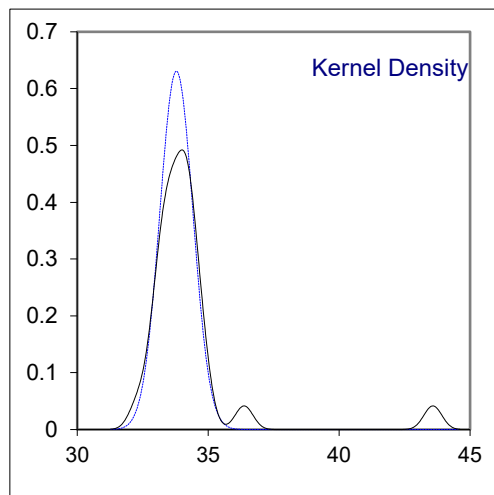
Determination of PIONA - Olefins on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171	D6839	0.6		1.74	0.6		
311	D5443Mod.	0.4		0.45	0.4		
323		-----		-----	-----		
333	D6839	0.5		1.09	0.4		
334	ISO22854-A	0.40		0.45	0.34		
349		-----		-----	-----		
360		-----		-----	0.35		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	0.41		0.51	0.36		
657		-----		-----	-----		
754	D6729	0.153		-1.15	0.153		
779	D6729	0.174		-1.02	0.170		
781	D6729	0.010		-2.08	0.010		
785	D6729	0.1989	C	-0.85	0.1863	C	fr. 0.3797 and 0.3566
798		-----		-----	-----		
824	D6839	0.41		0.51	0.40		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	0.318		-0.08	0.298		
874	D6729	0.349		0.12	0.351		
875	D6729	0.227		-0.67	0.220		
876		-----		-----	-----		
914		-----		-----	-----		
922		-----		-----	-----		
971	D6839	0.14		-1.24	0.17		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	0.35		0.12	0.32		
1039	ISO22854-A	0.41		0.51	0.36		
1062	D6839	0.39		0.38	0.41		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	0.1		-1.49	0.1		
1191	ISO22854-A	0.48		0.96	0.44		
1205	D8071	0.341		0.06	0.343		
1538		-----		-----	-----		
1544	D5134	0.565		1.51	0.505		
1586	D6839	0.16		-1.11	0.16		
1656		-----		-----	-----		
1677	D6839	0.50		1.09	0.49		
1720		-----		-----	-----		
1737	In house	0.45		0.77	0.39		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	<0.4	C	-----	<0.4	C	fr. 0.02 and 0.03
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	0.07		-1.69	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	0.20		
6185	In house	0.37		0.25	0.42		
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	0.46		0.83	0.40		
7009		-----		-----	-----		
9008		-----		-----	-----		

|					
normality	OK		OK	
n	27		28	
outliers	0		0	
mean (n)	0.3310		0.3195	
st.dev. (n)	0.15766		0.13557	
R(calc.)	0.4415		0.3796	
st.dev.(D6839:21a)	0.15462		n.a.	
R(D6839:21a)	0.4329		n.a.	

Determination of PIONA - Aromatics on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171	D6839	8.3		0.95	9.7		
311	D5443Mod.	8.7		2.67	10.2		
323		-----		-----	-----		
333	D6839	7.9		-0.77	9.3		
334	ISO22854-A	8.07		-0.04	9.46		
349		-----		-----	-----		
360		-----		-----	9.50		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	7.78		-1.29	9.13		
657		-----		-----	-----		
754	D6729	7.951		-0.55	9.344		
779	D6729	7.845		-1.01	9.195		
781	D6729	7.507		-2.46	8.842		
785	D6729	7.3987	C	-2.93	8.7054	C	fr. 7.6101 and 8.9631
798		-----		-----	-----		
824	D6839	8.29		0.91	9.71		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	7.678		-1.73	9.048		
874	D6729	7.574		-2.17	8.867		
875	D6729	7.828		-1.08	9.213		
876		-----		-----	-----		
914		-----		-----	-----		
922	D6730	8.026		-0.23	9.424		
971	D6839	9.23		4.95	10.80		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	8.53		1.94	9.98		
1039	ISO22854-A	8.09		0.05	9.48		
1062	D6839	8.98		3.88	10.50		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	8.6		2.24	10.1		
1191	ISO22854-A	8.71		2.71	10.20		
1205	D8071	7.041		-4.47	8.288		
1538	D6730	8.160		0.35	9.640		
1544	D5134	7.665		-1.78	8.995		
1586	D6839	8.32		1.04	9.73		
1656		-----		-----	-----		
1677	D6839	8.65		2.46	10.13		
1720		-----		-----	-----		
1737	In house	7.95		-0.56	9.33		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	8.13		0.22	9.50		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	7.82		-1.11	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	9.5993		
6185	In house	8.2		0.52	9.82		
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	7.45		-2.71	8.74		
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	30			31		
	outliers	0			0		
	mean (n)	8.0791			9.4991		
	st.dev. (n)	0.49442			0.55709		
	R(calc.)	1.3844			1.5598		
	st.dev.(D6839:21a)	0.23245			n.a.		
	R(D6839:21a)	0.6508			n.a.		

Aromatics %V/V

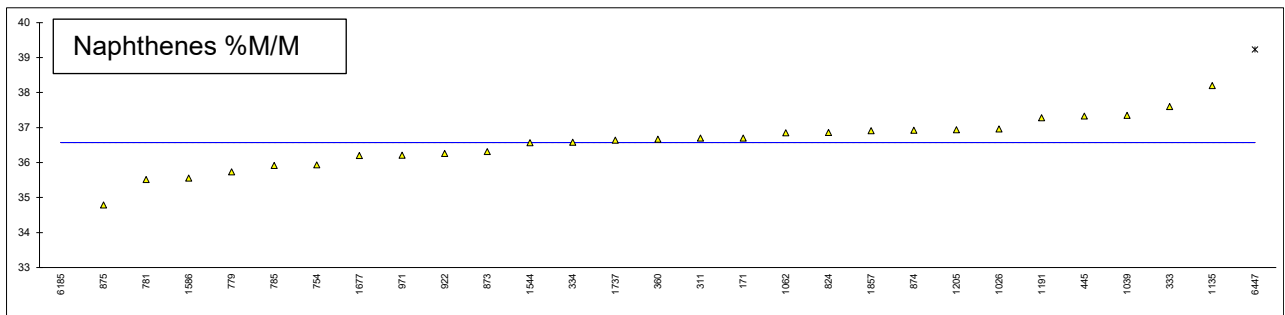Kernel Density
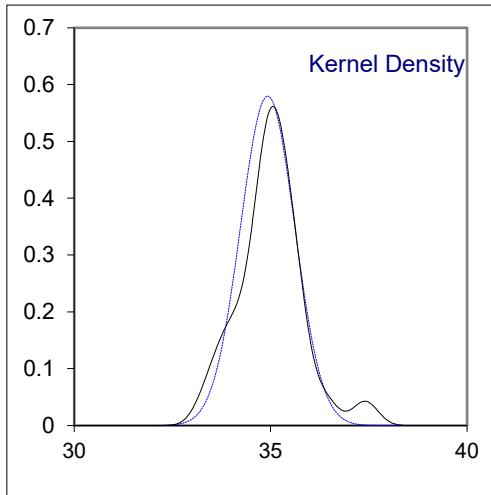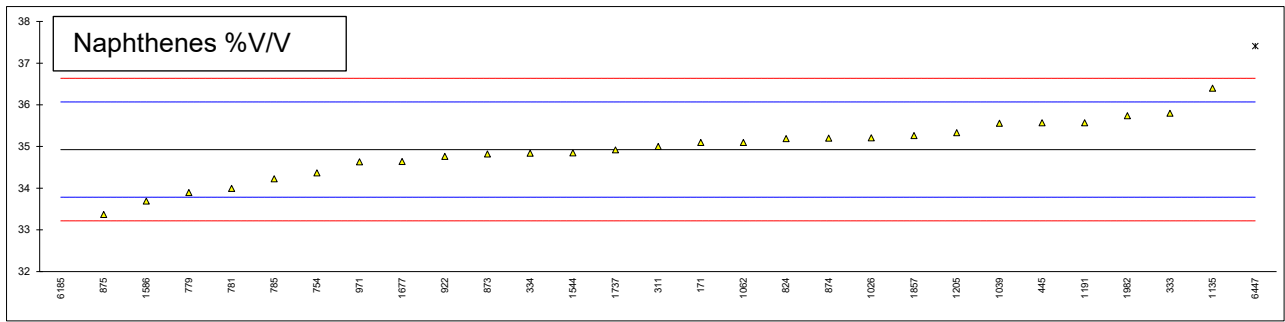

Aromatics %M/M

Kernel Density
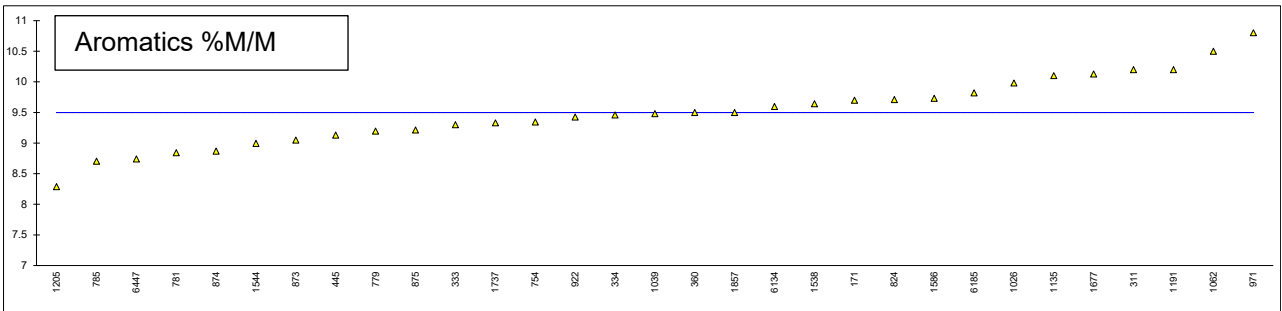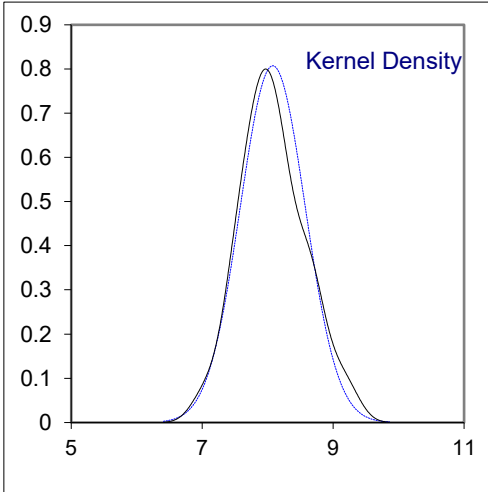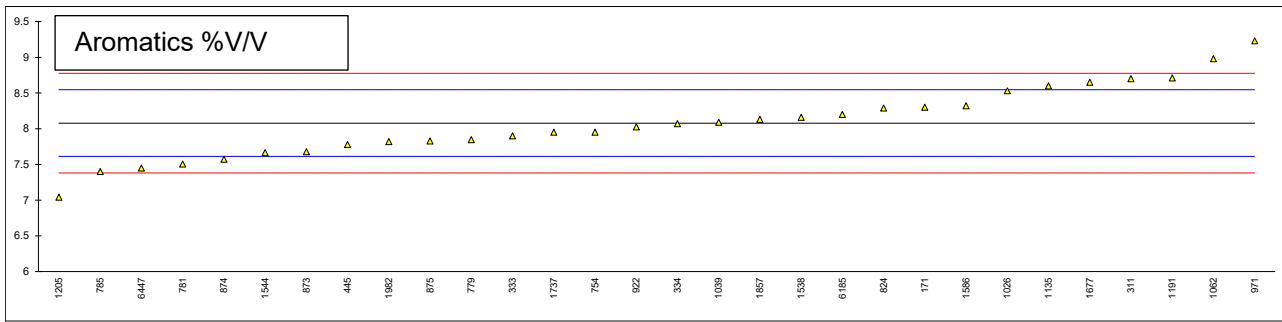
Determination of PIONA - Naphthenes on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171	D6839	35.1		0.30	36.7		
311	D5443Mod.	35.0		0.13	36.7		
323		-----		-----	-----		
333	D6839	35.8		1.53	37.6		
334	ISO22854-A	34.84		-0.15	36.58		
349		-----		-----	-----		
360		-----		-----	36.67		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	35.57		1.13	37.33		
657		-----		-----	-----		
754	D6729	34.369		-0.98	35.933		
779	D6729	33.894		-1.81	35.737		
781	D6729	33.993		-1.63	35.516		
785	D6729	34.2254	C	-1.23	35.9155	C	fr. 32.7863 and 34.4331
798		-----		-----	-----		
824	D6839	35.19		0.46	36.86		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	34.822		-0.18	36.312		
874	D6729	35.198		0.47	36.925		
875	D6729	33.368		-2.73	34.786		
876		-----		-----	-----		
914		-----		-----	-----		
922	D6730	34.762		-0.29	36.260		
971	D6839	34.63		-0.52	36.21		
994		-----		-----	-----		
1012		-----		-----	-----		
1026	ISO22854-A	35.21		0.50	36.96		
1039	ISO22854-A	35.56		1.11	37.35		
1062	D6839	35.10		0.30	36.85		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	36.4		2.58	38.2		
1191	ISO22854-A	35.57		1.13	37.28		
1205	D8071	35.329		0.70	36.937		
1538		-----		-----	-----		
1544	D5134	34.845		-0.14	36.565		
1586	D6839	33.69	C	-2.16	35.56	C	fr. 29.36 and 31.45
1656		-----		-----	-----		
1677	D6839	34.64		-0.50	36.20		
1720		-----		-----	-----		
1737	In house	34.92		-0.01	36.64		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	35.26		0.58	36.91		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	35.74		1.42	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	-----		
6185	In house	24.1	R(0.01)	-18.95	25.37	R(0.01)	
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	37.41	R(0.05)	4.35	39.23	R(0.05)	
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	27			27		
	outliers	2			2		
	mean (n)	34.9269			36.5736		
	st.dev. (n)	0.68802			0.71839		
	R(calc.)	1.9265			2.0115		
	st.dev.(D6839:21a)	0.57143			n.a.		
	R(D6839:21a)	1.6			n.a.		

Naphthenes %V/V

Kernel Density

Naphthenes %M/M

Kernel Density
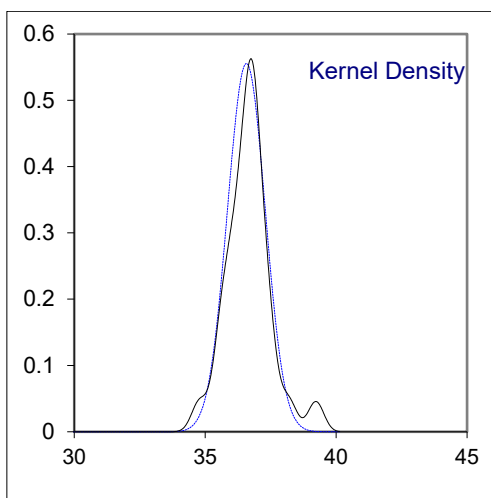
Determination of PIONA - C4 and lighter hydrocarbons on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	z(targ)	value in %M/M	mark	remarks
140		-----		-----	-----		
150		-----		-----	-----		
171	D6839	0.3		-----	0.3		
311	D5443Mod.	0.32		-----	0.26		
323		-----		-----	-----		
333		-----		-----	-----		
334	ISO22854-A	0.39		-----	0.32		
349		-----		-----	-----		
360		-----		-----	-----		
399		-----		-----	-----		
444		-----		-----	-----		
445	D6839	0.34		-----	0.28		
657		-----		-----	-----		
754	D6729	0.079		-----	0.062		
779	D6729	0.114		-----	0.088		
781	D6729	0.123		-----	0.095		
785	D6729	0.1120	C	-----	0.0869		First reported 0.1153
798		-----		-----	-----		
824		-----		-----	-----		
855		-----		-----	-----		
862		-----		-----	-----		
868		-----		-----	-----		
873	D6729	0.100		-----	0.100		
874	D6729	0.125		-----	0.097		
875	D6729	0.116		-----	0.090		
876		-----		-----	-----		
914		-----		-----	-----		
922		-----		-----	-----		
971	D6839	0.10		-----	0.08		
994		-----		-----	-----		
1012		-----		-----	-----		
1026		-----		-----	-----		
1039	ISO22854-A	0.41		-----	0.33		
1062	D6839	0.34		-----	0.28		
1065		-----		-----	-----		
1081		-----		-----	-----		
1135	D6839	0.1		-----	0.1		
1191		-----		-----	-----		
1205	D8071	0.122		-----	0.095		
1538		-----		-----	-----		
1544	D5134	0.065		-----	0.045		
1586		-----		-----	-----		
1656		-----		-----	-----		
1677	D6839	0.38		-----	0.38		
1720		-----		-----	-----		
1737	In house	0.42		-----	0.35		
1776		-----		-----	-----		
1823		-----		-----	-----		
1857	ISO22854-A	0.07		-----	0.05		
1862		-----		-----	-----		
1950		-----		-----	-----		
1982	D6839	0.12		-----	-----		
1995		-----		-----	-----		
6028		-----		-----	-----		
6134		-----		-----	0.0927		
6185	In house	0.12		-----	0.09		
6198		-----		-----	-----		
6200		-----		-----	-----		
6447	D6839	0.41		-----	0.33		
7009		-----		-----	-----		
9008		-----		-----	-----		
	normality	OK			OK		
	n	23			23		
	outliers	0			0		
	mean (n)	0.2077			0.1740		
	st.dev. (n)	0.13480			0.11825		
	R(calc.)	0.3774			0.3311		
	st.dev.(D6839:21a)	n.a.			n.a.		
	R(D6839:21a)	n.a.			n.a.		

≤ C4 %V/V

Kernel Density

≤ C4 %M/M

Kernel Density
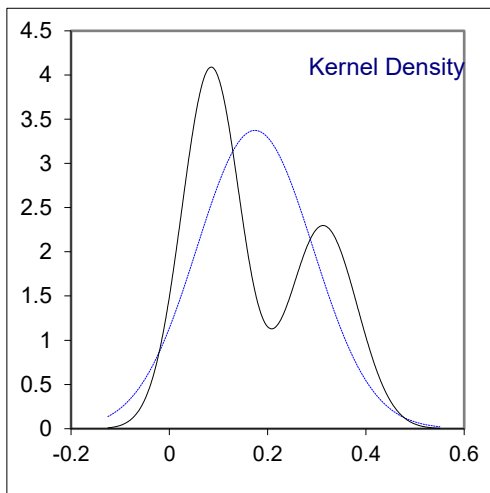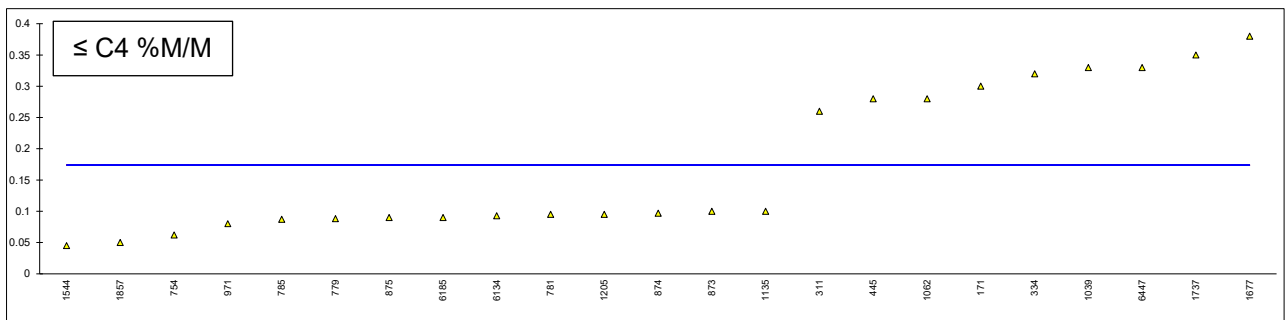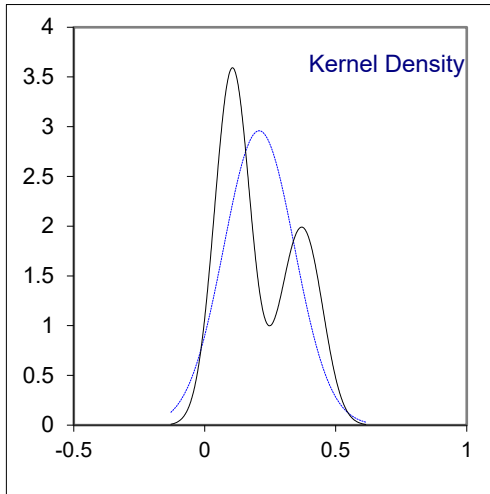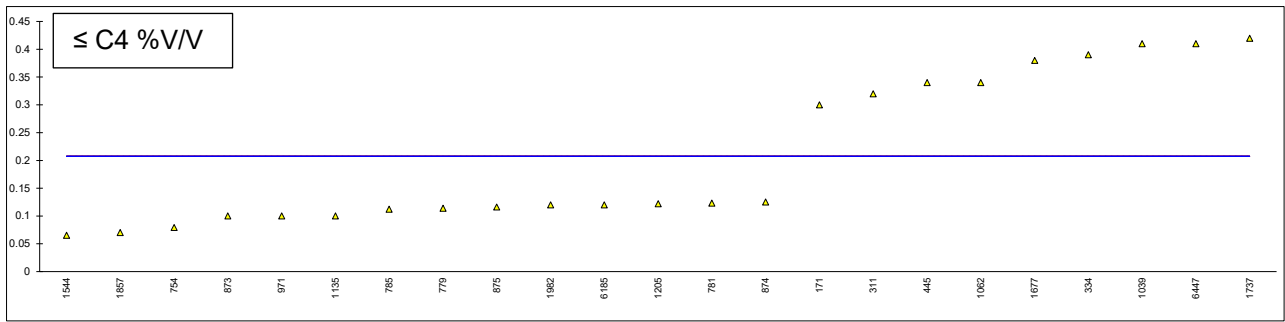
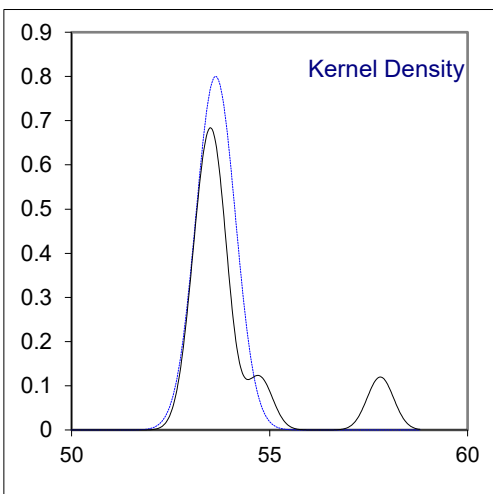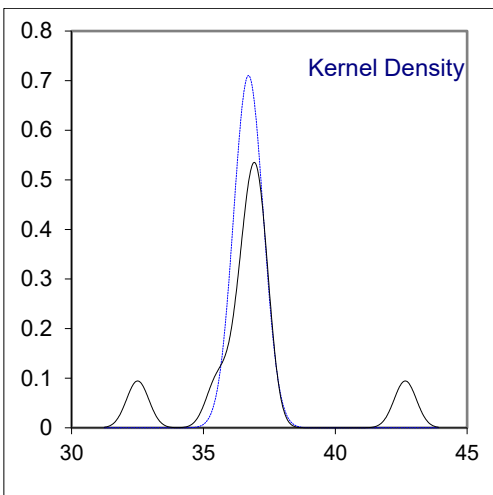## Determination of PNA - Total Paraffins on sample #23044; results in %V/V and %M/M

lab	method	value in %V/V	mark	value in %M/M	mark	z(targ)	remarks
140		-----		47.94	G(0.05)	-12.81	
150		-----		-----		-----	
171	D5443	56.48		53.38		-0.58	
311	D5443	56.7		53.7		0.14	
323		-----		-----		-----	
333		-----		-----		-----	
334		-----		-----		-----	
349		-----		-----		-----	
360		-----		-----		-----	
399		-----		-----		-----	
444		-----		-----		-----	
445	D5443	56.64		53.56		-0.17	
657		-----		-----		-----	
754		-----		-----		-----	
779		-----		-----		-----	
781	D6729	57.621		54.740		2.48	
785		-----		-----		-----	
798		-----		-----		-----	
824	D5443	56.83		53.76		0.28	
855		-----		-----		-----	
862		-----		-----		-----	
868		-----		-----		-----	
873		-----		-----		-----	
874		-----		-----		-----	
875		-----		-----		-----	
876		-----		-----		-----	
914		-----		-----		-----	
922		-----		-----		-----	
971	D6839	56.68		53.60		-0.08	
994		-----		-----		-----	
1012		-----		-----		-----	
1026	ISO22854-A	56.24		53.10		-1.21	
1039		-----		-----		-----	
1062		-----		-----		-----	
1065		-----		-----		-----	
1081		-----		-----		-----	
1135		-----		-----		-----	
1191		-----		-----		-----	
1205		-----		-----		-----	
1538	D5443	56.40		-----		-----	
1544		-----		-----		-----	
1586		-----		-----		-----	
1656		-----	W	-----	W	-----	reported 59.65 and 56.69
1677		-----		-----		-----	
1720		-----		-----		-----	
1737		-----		-----		-----	
1776	ISO22854-A	54.9		-----		-----	
1823		-----		-----		-----	
1857	ISO22854-A	56.13		53.26		-0.85	
1862		-----		-----		-----	
1950		-----		-----		-----	
1982	D6839	55.68		-----		-----	
1995		-----		-----		-----	
6028		-----		-----		-----	
6134		-----		-----		-----	
6185		-----		-----		-----	
6198		-----		-----		-----	
6200		-----		-----		-----	
6447		-----		-----		-----	
7009		-----		-----		-----	
9008		-----		57.800	G(0.01)	9.36	

normality	suspect		not OK	
n	11		8	
outliers	0		2	
mean (n)	56.3910		53.637	
st.dev. (n)	0.69095		0.4985	
R(calc.)	1.9347		1.3958	
st.dev.(D5443:23)	n.a.		0.4446	
R(D5443:23)	n.a.		1.2450	

Total Paraffins %V/V

Kernel Density

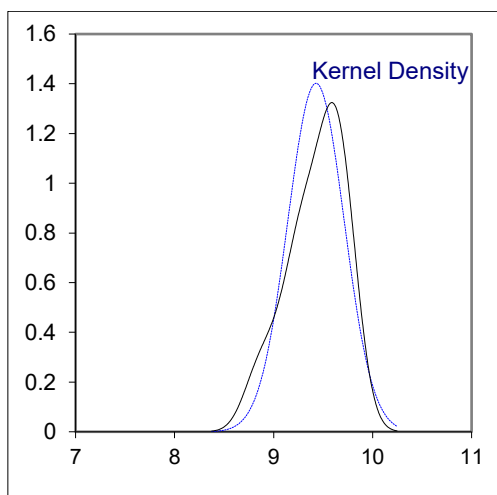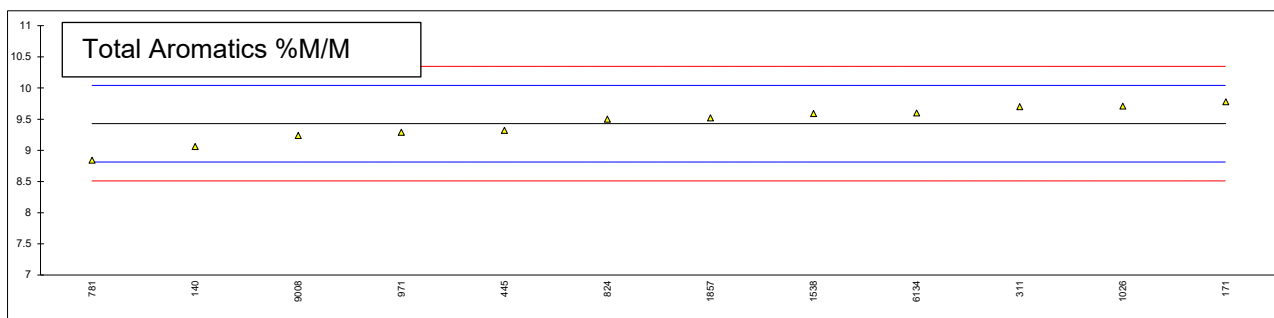Total Paraffins %M/M

Kernel Density
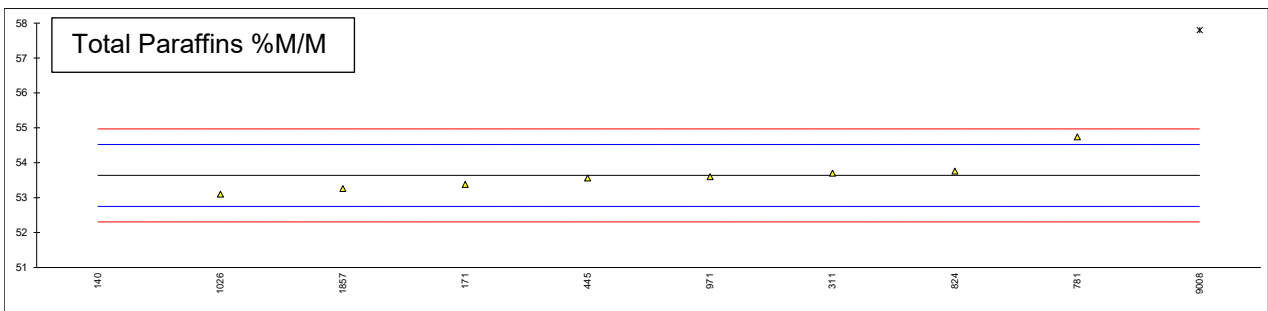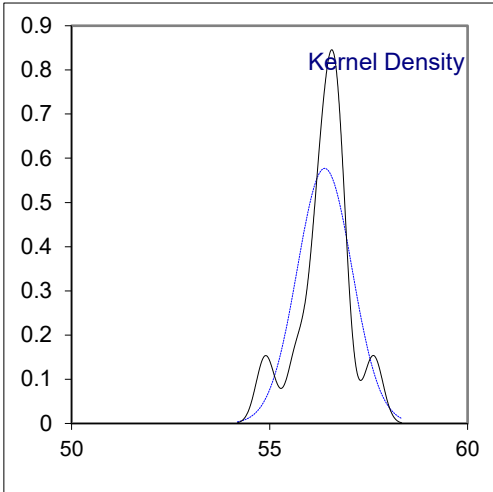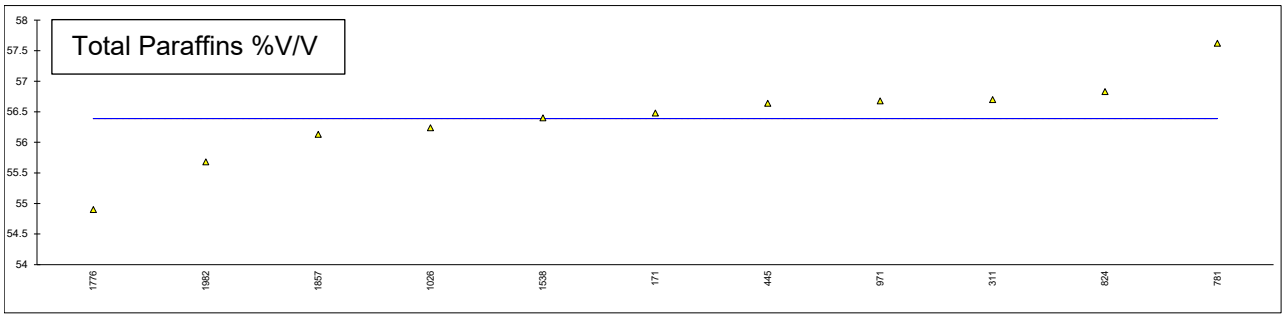
Determination of PNA - Total Naphthenes on sample #23044; results in %V/V and %M/M

lab	method	value in % V/V	mark	value in % M/M	mark	z(targ)	remarks
140		-----		42.65	G(0.05)	24.99	
150		-----		-----		-----	
171	D5443	34.70		36.35		-1.48	
311	D5443	35.0		36.6		-0.43	
323		-----		-----		-----	
333		-----		-----		-----	
334		-----		-----		-----	
349		-----		-----		-----	
360		-----		-----		-----	
399		-----		-----		-----	
444		-----		-----		-----	
445	D5443	35.41		37.12		1.75	
657		-----		-----		-----	
754		-----		-----		-----	
779		-----		-----		-----	
781	D6729	33.993		35.516		-4.99	
785		-----		-----		-----	
798		-----		-----		-----	
824	D5443	35.05		36.74		0.15	
855		-----		-----		-----	
862		-----		-----		-----	
868		-----		-----		-----	
873		-----		-----		-----	
874		-----		-----		-----	
875		-----		-----		-----	
876		-----		-----		-----	
914		-----		-----		-----	
922		-----		-----		-----	
971	D6839	35.42		37.11		1.71	
994		-----		-----		-----	
1012		-----		-----		-----	
1026	ISO22854-A	35.47		37.19		2.05	
1039		-----		-----		-----	
1062		-----		-----		-----	
1065		-----		-----		-----	
1081		-----		-----		-----	
1135		-----		-----		-----	
1191		-----		-----		-----	
1205		-----		-----		-----	
1538	D5443	35.48		-----		-----	
1544		-----		-----		-----	
1586		-----		-----		-----	
1656		-----	W	-----	W	-----	reported 32.66 and 34.27
1677		-----		-----		-----	
1720		-----		-----		-----	
1737		-----		-----		-----	
1776	ISO22854-A	36.2		-----		-----	
1823		-----		-----		-----	
1857	ISO22854-A	35.43		37.00		1.25	
1862		-----		-----		-----	
1950		-----		-----		-----	
1982	D6839	36.45	C	-----		-----	First reported 38.25
1995		-----		-----		-----	
6028		-----		-----		-----	
6134		-----		-----		-----	
6185		-----		-----		-----	
6198		-----		-----		-----	
6200		-----		-----		-----	
6447		-----		-----		-----	
7009		-----		-----		-----	
9008		-----		32.500	G(0.01)	-17.66	

|					
	normality	OK		not OK	
	n	11		8	
	outliers	0		2	
	mean (n)	35.3275		36.7033	
	st.dev. (n)	0.66705		0.56194	
	R(calc.)	1.8678		1.5734	
	st.dev.(D5443:23)	n.a.		0.238	
	R(D5443:23)	n.a.		0.6664	
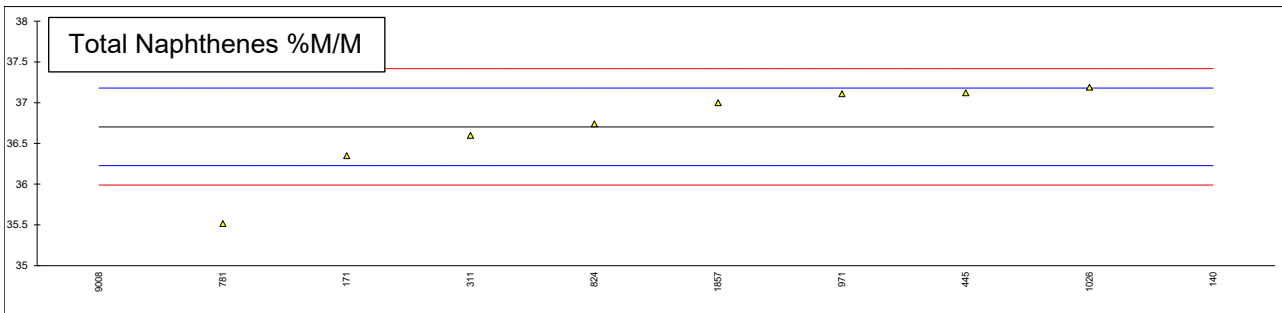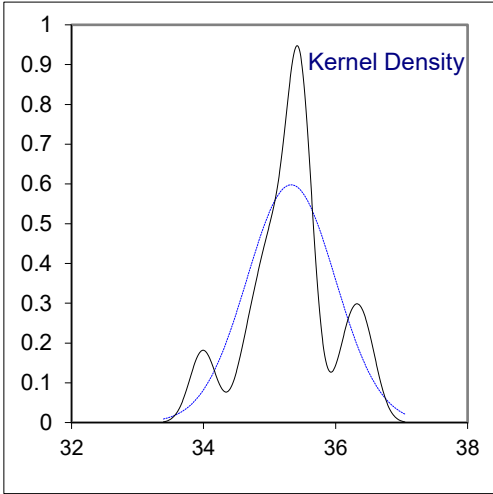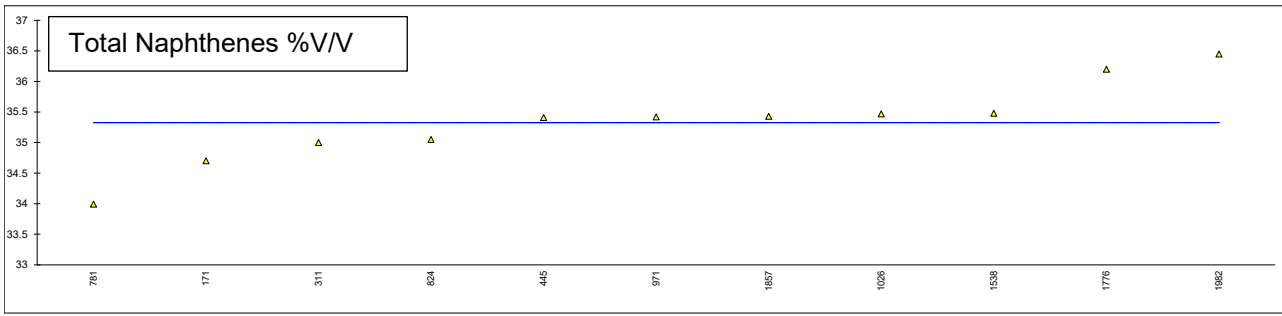
Determination of PNA - Total Aromatics on sample #23044; results in %V/V and %M/M

| lab	method	value in % V/V	mark	value in % M/M	mark	z(targ)	remarks
140		-----		9.06		-1.20	
150		-----		-----		-----	
171	D5443	8.34		9.78		1.14	
311	D5443	8.3		9.7		0.88	
323		-----		-----		-----	
333		-----		-----		-----	
334		-----		-----		-----	
349		-----		-----		-----	
360		-----		-----		-----	
399		-----		-----		-----	
444		-----		-----		-----	
445	D5443	7.95		9.32		-0.36	
657		-----		-----		-----	
754		-----		-----		-----	
779		-----		-----		-----	
781	D6729	7.507		8.842		-1.91	
785		-----		-----		-----	
798		-----		-----		-----	
824	D5443	8.11		9.50		0.23	
855		-----		-----		-----	
862		-----		-----		-----	
868		-----		-----		-----	
873		-----		-----		-----	
874		-----		-----		-----	
875		-----		-----		-----	
876		-----		-----		-----	
914		-----		-----		-----	
922		-----		-----		-----	
971	D6839	7.89		9.29		-0.45	
994		-----		-----		-----	
1012		-----		-----		-----	
1026	ISO22854-A	8.29		9.71		0.91	
1039		-----		-----		-----	
1062		-----		-----		-----	
1065		-----		-----		-----	
1081		-----		-----		-----	
1135		-----		-----		-----	
1191		-----		-----		-----	
1205		-----		-----		-----	
1538	D5443	8.12		9.59		0.52	
1544		-----		-----		-----	
1586		-----		-----		-----	
1656		-----	W	-----	W	-----	reported 7.69 and 9.04
1677		-----		-----		-----	
1720		-----		-----		-----	
1737		-----		-----		-----	
1776	ISO22854-A	8.5		-----		-----	
1823		-----		-----		-----	
1857	ISO22854-A	8.17		9.52		0.30	
1862		-----		-----		-----	
1950		-----		-----		-----	
1982	D6839	7.87	C	-----		-----	fr. 9.21
1995		-----		-----		-----	
6028		-----		-----		-----	
6134		-----		9.5993		0.55	
6185		-----		-----		-----	
6198		-----		-----		-----	
6200		-----		-----		-----	
6447		-----		-----		-----	
7009		-----		-----		-----	
9008		-----		9.240		-0.62	
	normality	OK		OK			
	n	11		12			
	outliers	0		0			
	mean (n)	8.0952		9.4293			
	st.dev. (n)	0.27749		0.28468			
	R(calc.)	0.7770		0.7971			
	st.dev.(D5443:23)	n.a.		0.30707			
	R(D5443:23)	n.a.		0.8598			
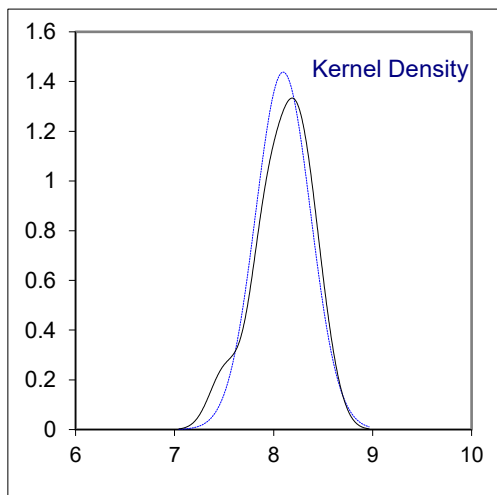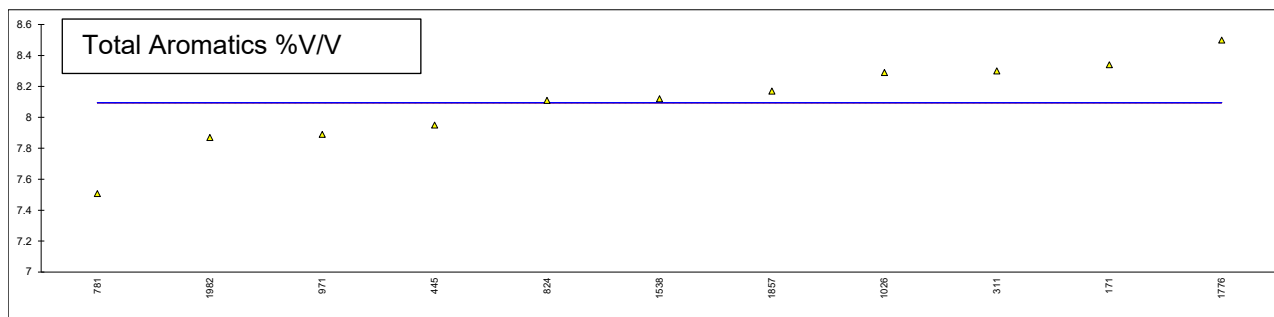
Determination of PNA - C4 and lighter hydrocarbons on sample #23044; results in %V/V and %M/M

lab	method	value in V/V	mark	value in % M/M	mark	z(targ)	remarks
140		-----		-----		-----	
150		-----		-----		-----	
171	D5443	0.09		0.06		-----	
311	D5443	0.52		0.40		-----	
323		-----		-----		-----	
333		-----		-----		-----	
334		-----		-----		-----	
349		-----		-----		-----	
360		-----		-----		-----	
399		-----		-----		-----	
444		-----		-----		-----	
445	D5443	0.46		0.36		-----	
657		-----		-----		-----	
754		-----		-----		-----	
779		-----		-----		-----	
781	D6729	0.123		0.095		-----	
785		-----		-----		-----	
798		-----		-----		-----	
824		-----		-----		-----	
855		-----		-----		-----	
862		-----		-----		-----	
868		-----		-----		-----	
873		-----		-----		-----	
874		-----		-----		-----	
875		-----		-----		-----	
876		-----		-----		-----	
914		-----		-----		-----	
922		-----		-----		-----	
971	D6839	0.44		0.34		-----	
994		-----		-----		-----	
1012		-----		-----		-----	
1026		-----		-----		-----	
1039		-----		-----		-----	
1062		-----		-----		-----	
1065		-----		-----		-----	
1081		-----		-----		-----	
1135		-----		-----		-----	
1191		-----		-----		-----	
1205		-----		-----		-----	
1538		-----		-----		-----	
1544		-----		-----		-----	
1586		-----		-----		-----	
1656		-----		-----		-----	
1677		-----		-----		-----	
1720		-----		-----		-----	
1737		-----		-----		-----	
1776		-----		-----		-----	
1823		-----		-----		-----	
1857	ISO22854-A	0.07		0.05		-----	
1862		-----		-----		-----	
1950		-----		-----		-----	
1982		-----		-----		-----	
1995		-----		-----		-----	
6028		-----		-----		-----	
6134		-----		0.0927		-----	
6185		-----		-----		-----	
6198		-----		-----		-----	
6200		-----		-----		-----	
6447		-----		-----		-----	
7009		-----		-----		-----	
9008		-----		0.350		-----	
	normality	unknown		unknown			
	n	6		8			
	outliers	0		0			
	mean (n)	0.2838		0.2185			
	st.dev. (n)	0.20993		0.15566			
	R(calc.)	0.5878		0.4358			
	st.dev.(D5443:23)	n.a.		unknown			
	R(D5443:23)	n.a.		unknown			

Determination of Pentane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	0.81		-0.96	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	0.7790		-1.65	
445		-----		-----	
657	D6730	0.8197		-0.74	
754	D6729	0.841		-0.27	
779	D6729	0.844		-0.20	
781	D6729	0.880		0.60	
785	D6729	0.8481	C	-0.11	First reported 0.8666
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	0.890		0.82	
874	D6729	0.896		0.95	
875	D6729	0.851		-0.05	
876		-----		-----	
914		-----		-----	
922	D6729	0.860		0.15	
971		-----		-----	
994	D5134	0.80	C	-1.18	First reported 1.01
1012		-----		-----	
1026	UOP551	0.8962		0.96	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205	D8071	0.836		-0.38	
1538	D6730	0.851		-0.05	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	0.859		0.13	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	0.867		0.31	
1862	D5134	0.860		0.15	
1950	D5134	0.874		0.47	
1982	D6730	0.896		0.95	
1995		-----		-----	
6028		-----		-----	
6134	D6730	0.85		-0.07	
6185	In house	0.86		0.15	
6198		-----		-----	
6200	D6730	1.3081	R(0.01)	10.12	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	normality	OK			
	n	22			
	outliers	1			
	mean (n)	0.8531			
	st.dev. (n)	0.03108			
	R(calc.)	0.0870			
	st.dev.(D5134:21)	0.04495			
	R(D5134:21)	0.1259			

Kernel Density
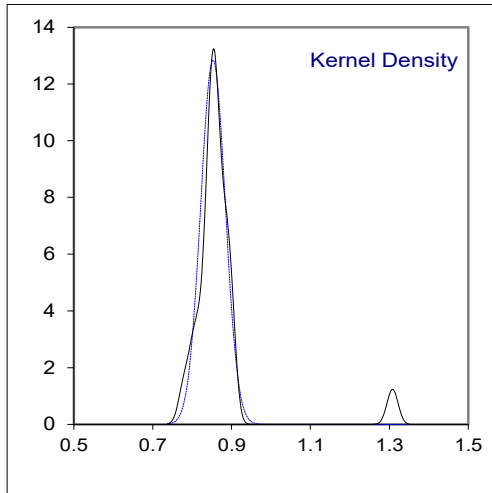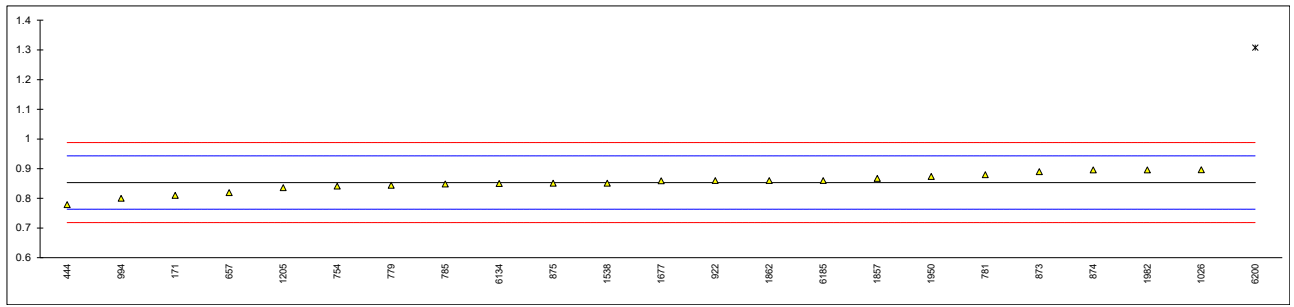
Determination of Benzene on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	0.09		-1.04	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	0.0914		-0.84	
445		-----		-----	
657	D6730	0.0923		-0.71	
754	D6729	0.095		-0.32	
779	D6729	0.096		-0.17	
781	D6729	0.100		0.41	
785	D6729	0.0917	C	-0.79	First reported 0.0931
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	0.100		0.41	
874	D6729	0.101		0.56	
875	D6729	0.096		-0.17	
876		-----		-----	
914		-----		-----	
922	D6729	0.099		0.27	
971		-----		-----	
994	D5134	0.11		1.86	
1012		-----		-----	
1026	UOP551	0.1012		0.58	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191	ISO22854-A	0.26	R(0.01)	23.63	
1205	D8071	0.101		0.56	
1538	D6730	0.096		-0.17	
1544	D5134	0.08	C,R(0.01)	-2.49	First reported 0.280
1586		-----		-----	
1656		-----		-----	
1677	D6729	0.098		0.12	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	0.097	C	-0.02	First reported 0.079
1862	D5134	0.092		-0.75	
1950	D5134	0.096		-0.17	
1982	D6730	0.097		-0.02	
1995		-----		-----	
6028		-----		-----	
6134	D6730	0.2	C,R(0.01)	14.92	First reported 0.15
6185	In house	0.1		0.41	
6198		-----		-----	
6200	D6730	0.1350	R(0.01)	5.49	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	suspect
n	21
outliers	4
mean (n)	0.0972
st.dev. (n)	0.00455
R(calc.)	0.0127
st.dev.(D5134:21)	0.00689
R(D5134:21)	0.0193

Kernel Density
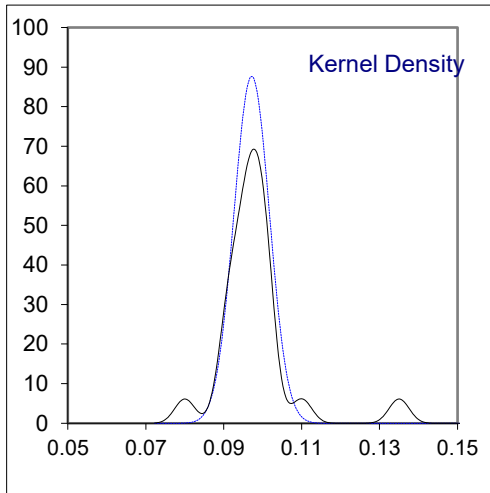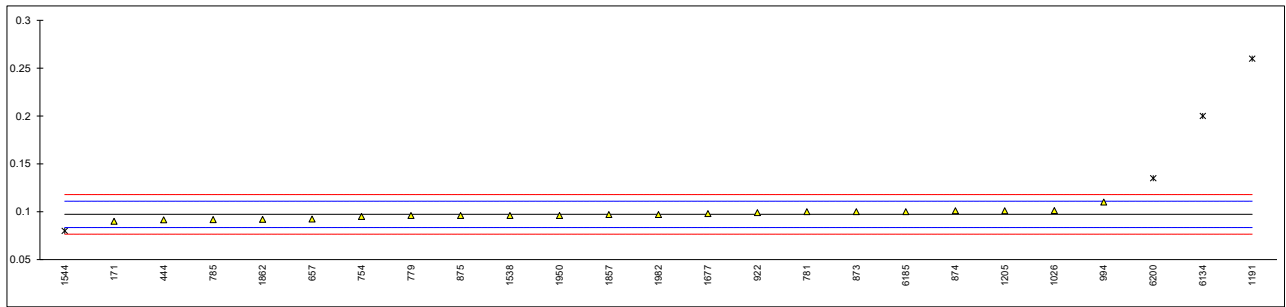
Determination of Cyclohexane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	2.14		-0.54	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	2.0737		-1.32	
445		-----		-----	
657	D6730	2.1705		-0.18	
754	D6729	2.131		-0.65	
779	D6729	2.149		-0.43	
781	D6729	2.209		0.28	
785	D6729	2.2098	C	0.29	First reported 2.2393
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	2.260		0.88	
874	D6729	2.263		0.92	
875	D6729	2.150		-0.42	
876		-----		-----	
914		-----		-----	
922	D6729	2.222		0.43	
971		-----		-----	
994	D5134	2.11	C	-0.89	First reported 2.50
1012		-----		-----	
1026	UOP551	2.2238		0.45	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205	D8071	3.589	R(0.01)	16.61	
1538	D6730	2.156		-0.35	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	2.180		-0.07	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	2.218		0.38	
1862	D5134	2.224		0.46	
1950	D5134	2.230		0.53	
1982	D6730	2.227		0.49	
1995		-----		-----	
6028		-----		-----	
6134	D6730	2.15		-0.42	
6185	In house	2.2		0.17	
6198		-----		-----	
6200	D6730	2.8988	R(0.01)	8.44	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

normality	OK	
n	21	
outliers	2	
mean (n)	2.1856	
st.dev. (n)	0.05008	
R(calc.)	0.1402	
st.dev.(D5134:21)	0.08448	
R(D5134:21)	0.2365	

Kernel Density
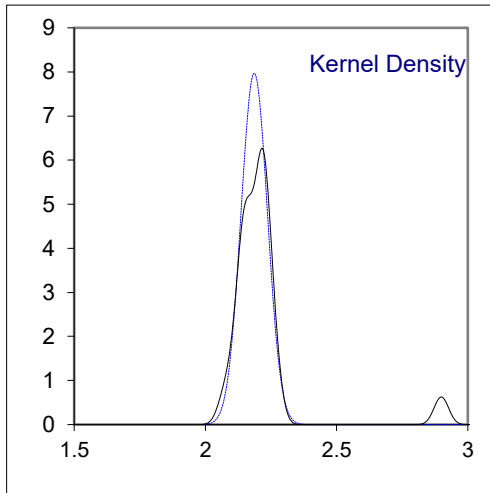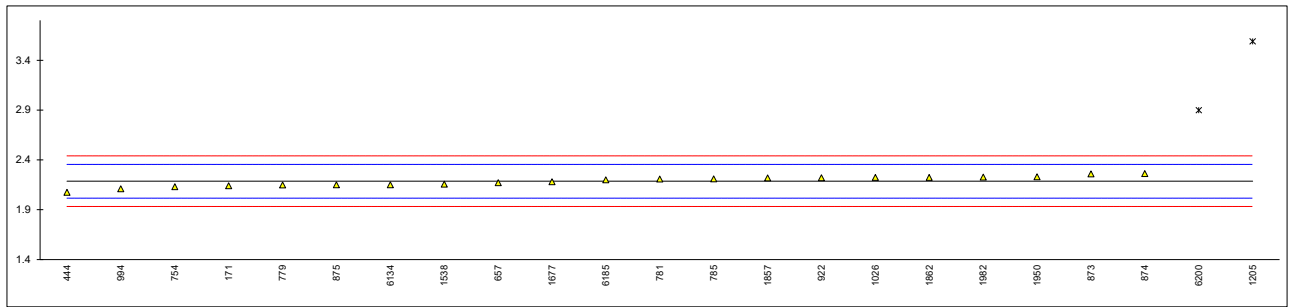
Determination of 2-Methylpentane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	1.617	C	-1.39	First reported 2.79
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	1.6133		-1.45	
445		-----		-----	
657	D6730	1.7026		-0.03	
754	D6729	1.658		-0.73	
779	D6729	1.674		-0.48	
781	D6729	1.774		1.11	
785	D6729	1.7291	C	0.40	First reported 1.7607
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	1.780		1.20	
874	D6729	1.805		1.60	
875	D6729	1.711		0.11	
876		-----		-----	
914		-----		-----	
922	D6729	1.711		0.11	
971		-----		-----	
994	D5134	1.59	C	-1.82	First reported 1.91
1012		-----		-----	
1026	UOP551	1.78		1.20	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538	D6730	1.673		-0.50	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	1.686		-0.29	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	1.695		-0.15	
1862	D5134	1.722		0.28	
1950	D5134	1.730		0.41	
1982	D6730	1.748		0.70	
1995		-----		-----	
6028		-----		-----	
6134	D6730	1.67		-0.54	
6185	In house	1.72		0.25	
6198		-----		-----	
6200	D6730	2.1767	R(0.01)	7.51	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	normality	OK			
	n	21			
	outliers	1			
	mean (n)	1.7042			
	st.dev. (n)	0.05697			
	R(calc.)	0.1595			
	st.dev.(Horwitz)	0.06291			
	R(Horwitz)	0.1762			
Compare					
	R(D5134:21)	0.0579			
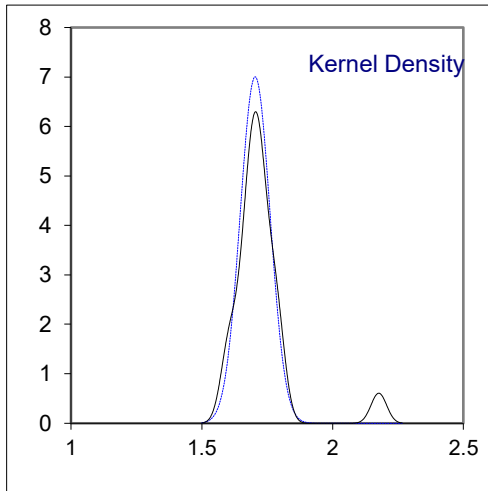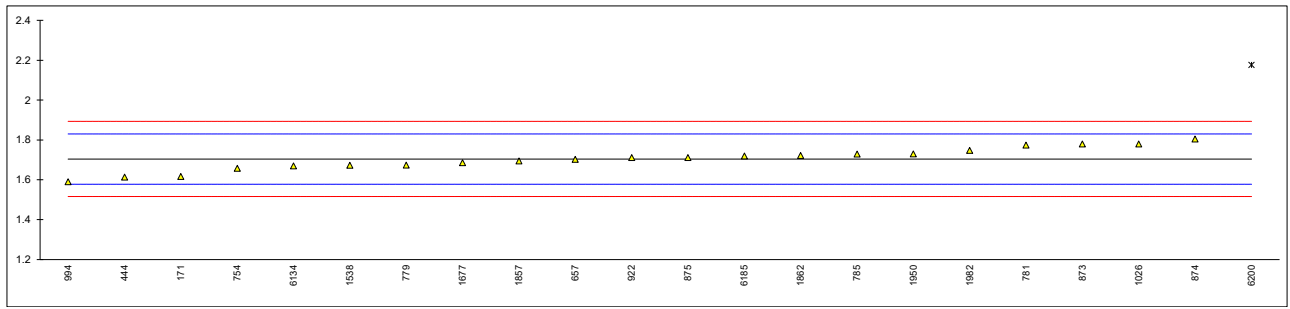
Determination of 3-Methylpentane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	1.247	C	-1.16	First reported 1.83
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	1.2407		-1.29	
445		-----		-----	
657	D6730	1.2873		-0.36	
754	D6729	1.282		-0.46	
779	D6729	1.294		-0.23	
781	D6729	1.351		0.91	
785	D6729	1.3218	C	0.33	First reported 1.3449
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	1.350		0.89	
874	D6729	1.363		1.15	
875	D6729	1.308		0.05	
876		-----		-----	
914		-----		-----	
922	D6729	1.322		0.33	
971		-----		-----	
994	D5134	1.23	C	-1.50	First reported 1.48
1012		-----		-----	
1026	UOP551	1.3382		0.66	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205		-----		-----	
1538	D6730	1.293		-0.24	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	1.300		-0.11	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	1.304		-0.03	
1862	D5134	1.315		0.19	
1950	D5134	1.330		0.49	
1982	D6730	1.344		0.77	
1995		-----		-----	
6028		-----		-----	
6134	D6730	1.29		-0.30	
6185	In house	1.3		-0.11	
6198		-----		-----	
6200	D6730	1.6815	R(0.01)	7.50	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	normality	OK			
	n	21			
	outliers	1			
	mean (n)	1.3053			
	st.dev. (n)	0.03601			
	R(calc.)	0.1008			
	st.dev.(Horwitz)	0.05016			
	R(Horwitz)	0.1404			
Compare					
	R(D5134:21)	0.0444			

Kernel Density
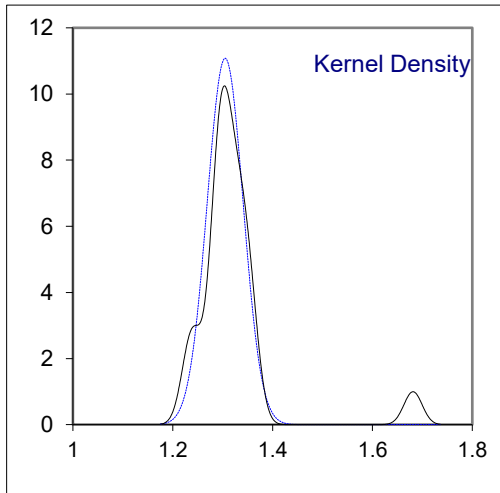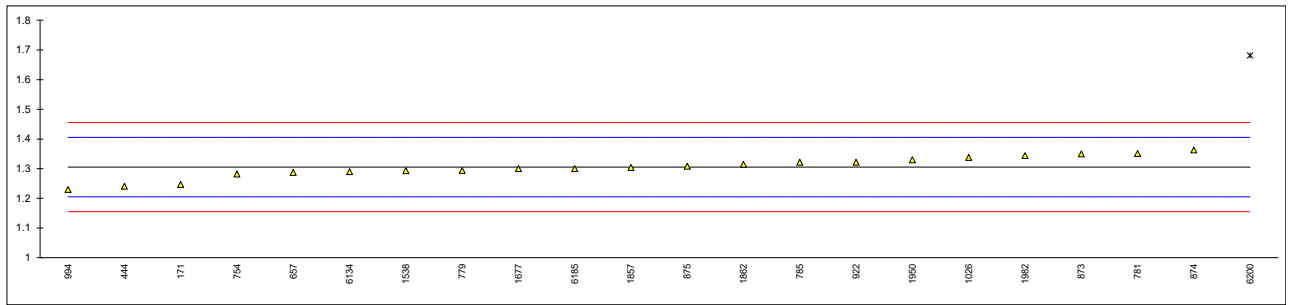
Determination of Heptane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	4.11		-0.87	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	4.1962		-0.24	
445		-----		-----	
657	D6730	4.1740		-0.40	
754	D6729	4.153		-0.56	
779	D6729	4.192		-0.27	
781	D6729	4.271		0.31	
785	D6729	4.3824	C	1.13	First reported 4.4928
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	4.320		0.67	
874	D6729	4.390		1.18	
875	D6729	4.202		-0.20	
876		-----		-----	
914		-----		-----	
922	D6729	4.436		1.52	
971		-----		-----	
994	D5134	4.05	C	-1.31	First reported 4.57
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205	D8071	4.106		-0.90	
1538	D5134	4.22		-0.06	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	4.198		-0.23	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	4.176		-0.39	
1862	D5134	4.260		0.23	
1950	D5134	4.273		0.32	
1982	D6730	4.295		0.49	
1995		-----		-----	
6028		-----		-----	
6134	D6730	4.19		-0.28	
6185	In house	4.21		-0.14	
6198		-----		-----	
6200	D6730	4.6883	R(0.01)	3.37	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	
	normality	OK			
	n	21			
	outliers	1			
	mean (n)	4.2288			
	st.dev. (n)	0.09712			
	R(calc.)	0.2719			
	st.dev.(Horwitz)	0.13615			
	R(Horwitz)	0.3812			
Compare					
	R(D5134:21)	0.0617			
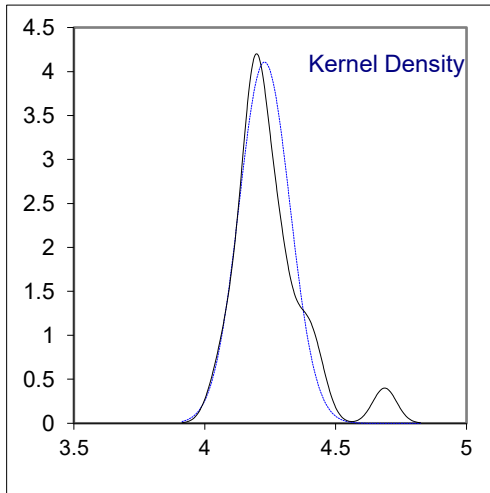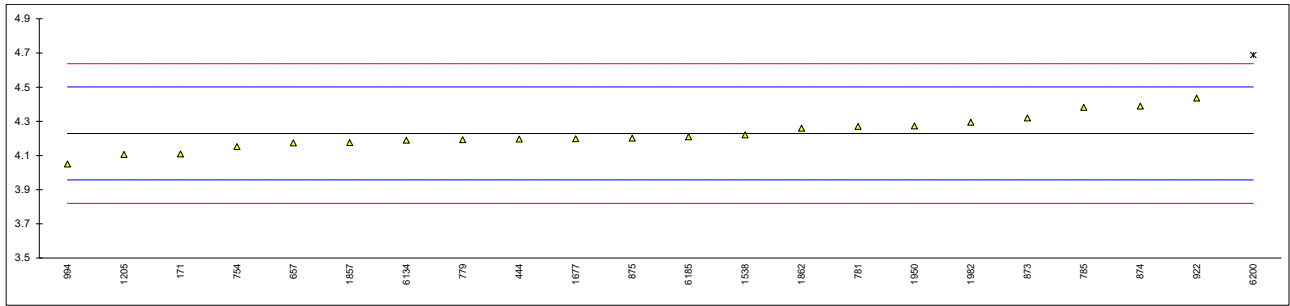
Determination of Toluene on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	1.09		0.25	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	1.0380		-0.97	
445		-----		-----	
657	D6730	1.0496		-0.70	
754	D6729	1.055		-0.57	
779	D6729	1.063		-0.38	
781	D6729	1.097		0.41	
785	D6729	1.0758	C	-0.08	First reported 1.0868
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	1.095		0.37	
874	D6729	1.076		-0.08	
875	D6729	1.082		0.06	
876		-----		-----	
914		-----		-----	
922	D6729	1.093		0.32	
971		-----		-----	
994	D5134	1.08	C	0.01	First reported 1.23
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191	ISO22854-A	2.04	R(0.01)	22.51	
1205	D8071	1.087		0.18	
1538	D5134/UOP744	1.07		-0.22	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	1.086		0.15	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	1.102		0.53	
1862	D5134	1.086		0.15	
1950	D5134	1.070		-0.22	
1982	D6730	1.072		-0.17	
1995		-----		-----	
6028		-----		-----	
6134	D6730	1.10		0.48	
6185	In house	1.1		0.48	
6198		-----		-----	
6200	D6730	1.2907	R(0.01)	4.95	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

	normality	OK	
	n	21	
	outliers	2	
	mean (n)	1.0794	
	st.dev. (n)	0.01744	
	R(calc.)	0.0488	
	st.dev.(Horwitz)	0.04268	
	R(Horwitz)	0.1195	
Compare			
	R(D5134:21)	0.0335	

Kernel Density
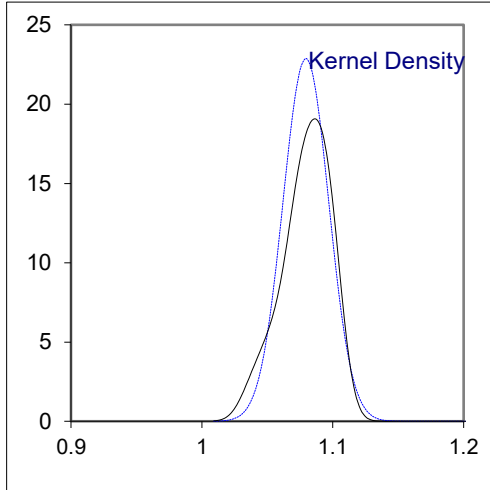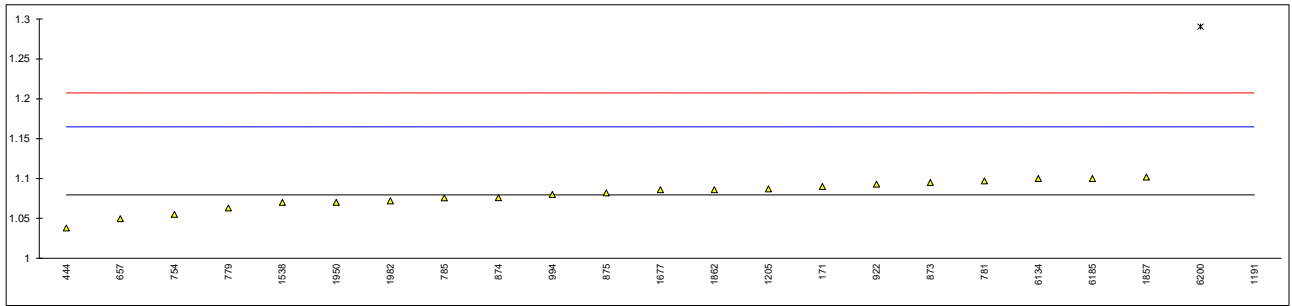
Determination of Octane on sample #23044; results in %M/M

lab	method	value	mark	z(targ)	remarks
140		-----		-----	
150		-----		-----	
171	D5134	5.74		-----	
311		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
349		-----		-----	
360		-----		-----	
399		-----		-----	
444	D6733	6.7410		-----	
445		-----		-----	
657	D6730	6.5615		-----	
754		-----		-----	
779		-----		-----	
781	D6729	6.873		-----	
785	D6729	6.2029	C	-----	First reported 6.7657
798		-----		-----	
824		-----		-----	
855		-----		-----	
862		-----		-----	
868		-----		-----	
873	D6729	6.540		-----	
874	D6729	5.938		-----	
875	D6729	6.823		-----	
876		-----		-----	
914		-----		-----	
922	D6729	6.481		-----	
971		-----		-----	
994		-----		-----	
1012		-----		-----	
1026		-----		-----	
1039		-----		-----	
1062		-----		-----	
1065		-----		-----	
1081		-----		-----	
1135		-----		-----	
1191		-----		-----	
1205	D8071	5.255	G(0.01)	-----	
1538		-----		-----	
1544		-----		-----	
1586		-----		-----	
1656		-----		-----	
1677	D6729	5.782		-----	
1720		-----		-----	
1737		-----		-----	
1776		-----		-----	
1823		-----		-----	
1857	D5134	6.861		-----	
1862	D5134	6.820		-----	
1950	D5134	6.991		-----	
1982	D6730	7.219		-----	
1995		-----		-----	
6028		-----		-----	
6134	D6730	6.61		-----	
6185	In house	7.21		-----	
6198		-----		-----	
6200	D6730	7.5980		-----	
6447		-----		-----	
7009		-----		-----	
9008		-----		-----	

	normality	OK	
	n	17	
	outliers	1	
	mean (n)	6.6466	
	st.dev. (n)	0.50941	
	R(calc.)	1.4263	
	st.dev.(D5134:21)	(0.16616)	
	R(D5134:21)	(0.4653)	
Compare			
	R(Horwitz)	0.5598	

Kernel Density
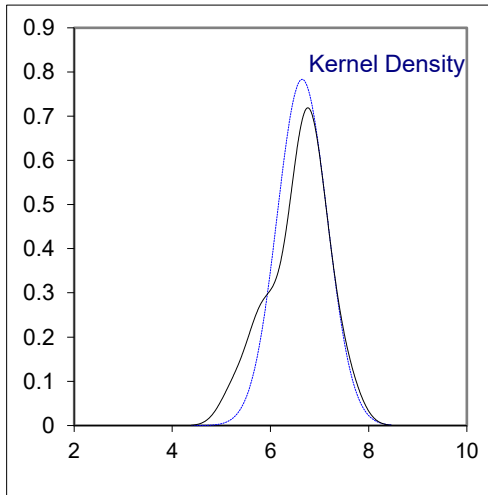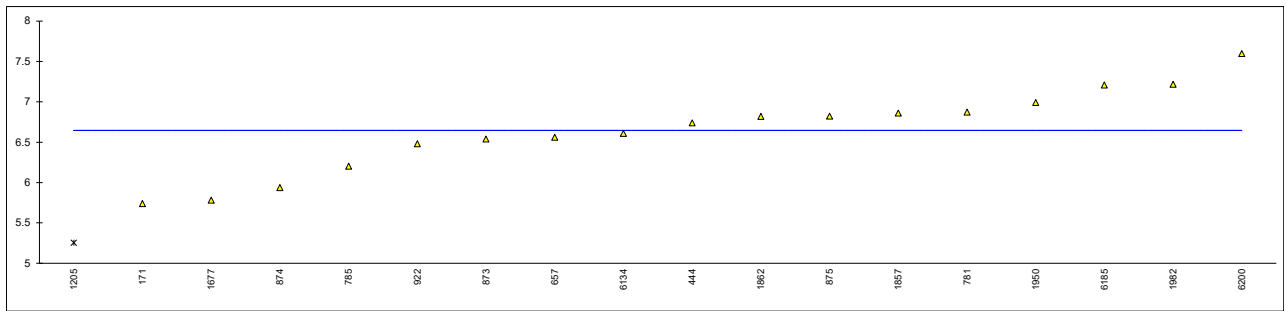
APPENDIX 2

Number of participants per country

    1 lab in AUSTRALIA

    1 lab in AZERBAIJAN

    4 labs in BELGIUM

    2 labs in BULGARIA

    6 labs in CHINA, People's Republic

    1 lab in EGYPT

    1 lab in ESTONIA

    1 lab in FINLAND

    3 labs in FRANCE

    1 lab in GERMANY

    2 labs in INDIA

    1 lab in IRAN, Islamic Republic of

    1 lab in ISRAEL

    1 lab in ITALY

    1 lab in KOREA, Republic of

    1 lab in KUWAIT

    1 lab in MALTA

    5 labs in NETHERLANDS

    1 lab in NIGERIA

    1 lab in PAKISTAN

    1 lab in POLAND

  11 labs in RUSSIAN FEDERATION

    1 lab in SINGAPORE

    1 lab in SPAIN

    1 lab in SUDAN

    1 lab in SWEDEN

    1 lab in TUNISIA

    1 lab in UNITED ARAB EMIRATES

    4 labs in UNITED KINGDOM

    3 labs in UNITED STATES OF AMERICA

APPENDIX 3

Abbreviations

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

Literature

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