Institute for
Interlaboratory Studies

Results of Proficiency Test
Xylenes (mixed-)
October 2023

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1995 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Xylenes (mixed-) once every two years. During the annual proficiency testing program of 2023 it was decided to continue the round robin for the analysis of Xylenes (mixed-).

In this interlaboratory study 28 laboratories in 18 countries registered for participation, see appendix 2 for the number of participants per country. In this report the results of the Xylenes (mixed-) 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 a laboratory that has performed the tests in accordance with for ISO/IEC17043 relevant requirements of ISO/IEC17025.
It was decided to send two different samples of mixed-Xylenes, 1x 250 mL glass bottle labelled #23181 and 1x 250 mL glass bottle labelled #23182.
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 15 liters of mixed-Xylenes was prepared from high purity Xylenes by iis. After homogenization 50 amber glass bottles of 250 mL were filled and labelled #23181.
The homogeneity of the subsamples was checked by determination of p-Xylene in accordance with ASTM D7504 on 8 stratified randomly selected subsamples.

	p-Xylene in %M/M
sample #23181-1	31.78
sample #23181-2	31.79
sample #23181-3	31.79
sample #23181-4	31.79
sample #23181-5	31.80
sample #23181-6	31.79
sample #23181-7	31.80
sample #23181-8	31.80

Table 1: homogeneity test results of subsamples #23181

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.

	p-Xylene in %M/M
r (observed)	0.02
reference test method	ASTM D7504:23
0.3 x R (reference test method)	0.15

Table 2: evaluation of repeatability of subsamples #23181

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

A batch of approximately 15 liters of mixed-Xylenes was prepared from high purity Xylenes by iis. After homogenization 50 amber glass bottles of 250 mL were filled and labelled #23182.
The homogeneity of the subsamples was checked by determination of p-Xylene in accordance with ASTM D7504 on 8 stratified randomly selected subsamples.

	p-Xylene in %M/M
sample #23182-1	29.20
sample #23182-2	29.21
sample #23182-3	29.21
sample #23182-4	29.21

	p-Xylene in %M/M
sample #23182-5	29.20
sample #23182-6	29.20
sample #23182-7	29.20
sample #23182-8	29.21

Table 3: homogeneity test results of subsamples #23182

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.

	p-Xylene in %M/M
r (observed)	0.01
reference test method	ASTM D7504:23
0.3 x R (reference test method)	0.14

Table 4: evaluation of repeatability of subsamples #23182

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 0.25 L bottle of mixed-Xylenes labelled #23181 and one 0.25 L bottle of mixed-Xylenes labelled #23182 were sent on September 6, 2023. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of mixed-Xylenes packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on samples #23181 and #23182: Benzene, Toluene, Ethylbenzene, p-Diethylbenzene, o-Xylene, m-Xylene, p-Xylene, sum of m- and p-Xylene, Total mixed-Xylenes, iso-Propylbenzene (Cumene), sum of C9 and heavier aromatics and Non-aromatics.

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

To get comparable test results a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of

instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

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

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

3.1 STATISTICS

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

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

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

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner’s outlier test can be used. Outliers are marked by D(0.01) for the Dixon’s test, by G(0.01) or DG(0.01) for the Grubbs’ test and by R(0.01) for the Rosner’s test. Stragglers are marked by D(0.05) for the Dixon’s test, by G(0.05) or

DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

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

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

3.2 GRAPHICS

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

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

3.3 Z-SCORES

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

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

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

Absolute values for z<2 are very common and absolute values for z>3 are very rare. 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 week. Two participants reported test results after the extended reporting date and three other participants did not report any test results. Not all participants were able to report all tests requested.
In total 25 participants reported 496 numerical test results. Observed were 30 outlying test results, which is 6.0%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER COMPONENT

In this section the reported test results are discussed per sample and per component. 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.

For the determination of mixed-Xylenes test method ASTM D7504 is considered to be the official test method as the previous test methods ASTM D2306, D2360 and D6563 are all withdrawn. Test method ASTM D7504 mentions a reproducibility per component at one defined concentration. Regretfully, not for all components the estimated target reproducibility derived from ASTM D7504 could be used. The estimated target reproducibilities as obtained from ASTM D7504:23 are for some components unrealistic (for example sum of C9 and heavier aromatics or Non-aromatics). This occurs when the concentrations of these components in the PT samples strongly deviates from the concentrations as mentioned in table 9 of ASTM D7504:23. For these components the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D7504) and an added designation for the year that the test method was adopted or revised (e.g. D7504:23).

sample #23181

Benzene: The group of participants may have had difficulty to meet the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Toluene: The group of participants may have had difficulty to meet the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

Ethylbenzene: The group of participants met the target requirements. 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.

p-Diethylbenzene: The group of participants may have had difficulty to meet the target requirements. Two statistical outliers were observed. Because of the large variation in test results no z-scores are calculated.

o-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

m-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

p-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

sum of m- and p-Xylene: The group of participants met the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D7504:23.

Total mixed-Xylenes: The group of participants met the target requirements. No statistical outliers were observed but four test results were excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D7504:23.
Total mixed Xylenes is the sum of m-Xylene, o-Xylene, p-Xylene and Ethylbenzene as per test method ASTM D7504:23 §15.1.2.

iso-Propylbenzene (Cumene): The group of participants had difficulty to meet the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D7504:23.

sum of C9 and heavier aromatics: The group of participants may have had difficulty to meet the target requirements. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the estimated reproducibility calculated with the Horwitz equation (4 components).

Non-aromatics: The group of participants may have had difficulty to meet the target requirements. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation (9 components).

sample #23182

Benzene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

Toluene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

Ethylbenzene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

p-Diethylbenzene: Almost all reporting participants agreed on a value near or below the limit of detection (<0.0002 %M/M). Therefore, no z-scores are calculated.

o-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

m-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

p-Xylene: The group of participants met the target requirements. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

sum of m- and p-Xylene: The group of participants met the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D7504:23.

Total mixed-Xylenes: The group of participants met the target requirements. No statistical outliers were observed but four test results were excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D7504:23.
Total mixed Xylenes is the sum of m-Xylene, o-Xylene, p-Xylene and Ethylbenzene as per test method ASTM D7504:23 §15.1.2.

iso-Propylbenzene (Cumene): The group of participants met the target requirements. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7504:23.

sum of C9 and heavier aromatics: The group of participants may have had difficulty to meet the target requirements. No statistical outliers were observed. The calculated reproducibility is not in agreement with the estimated reproducibility calculated with the Horwitz equation (4 components).

Non-aromatics: The group of participants may have had difficulty to meet the target requirements. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation (9 components).

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.

Component	unit	n	average	2.8 * sd	R(lit)
Benzene	%M/M	21	0.229	0.058	0.032
Toluene	%M/M	22	0.134	0.028	0.020
Ethylbenzene	%M/M	22	0.200	0.019	0.029
p-Diethylbenzene	%M/M	7	0.006	0.012	(0.001)
o-Xylene	%M/M	21	39.07	0.65	1.98
m-Xylene	%M/M	20	26.76	0.22	0.38
p-Xylene	%M/M	21	31.98	0.40	0.51
sum of m- and p-Xylene	%M/M	20	58.78	0.58	1.26
Total mixed-Xylenes	%M/M	14	98.08	0.72	5.39
iso-Propylbenzene (Cumene)	%M/M	20	0.068	0.016	0.008
sum of C9 and heavier aromatics	%M/M	17	0.741	0.907	0.174
Non-aromatics	%M/M	20	0.757	0.658	0.265

Table 5: reproducibilities of tests on sample #23181 / For results between brackets no z-scores are calculated.

Component	unit	n	average	2.8 * sd	R(lit)
Benzene	%M/M	21	0.004	0.001	0.010
Toluene	%M/M	22	0.010	0.002	0.023
Ethylbenzene	%M/M	21	9.90	0.21	0.32
p-Diethylbenzene	%M/M	9	<0.0002	n.e.	n.e.
o-Xylene	%M/M	22	20.33	0.20	1.03
m-Xylene	%M/M	22	40.28	0.26	0.57
p-Xylene	%M/M	22	29.30	0.25	0.47
sum of m- and p-Xylene	%M/M	21	69.60	0.35	1.49
Total mixed-Xylenes	%M/M	15	99.81	0.18	2.13
iso-Propylbenzene (Cumene)	%M/M	19	0.067	0.008	0.008
sum of C9 and heavier aromatics	%M/M	19	0.080	0.090	0.026
Non-aromatics	%M/M	21	0.066	0.039	0.033

Table 6: reproducibilities of tests on sample #23182

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

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

	October 2023	October 2021	October 2019	October 2017	October 2015
Number of reporting laboratories	25	24	22	27	29
Number of test results	496	506	406	502	546
Number of statistical outliers	30	23	18	33	42
Percentage of statistical outliers	6.0%	4.5%	4.4%	6.6%	7.7%

Table 7: 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 the following table.

Component	October 2023		October 2021		October 2019		October 2017		October 2015 *)	
Benzene	-	++	n.e.	++	-	++	n.e.	++	n.e.	-
Toluene	-	++	+/-	+/-	-	++	++	++	+	+/-
Ethylbenzene	+	+	-	++	+/-	+	+/-	++	++	--
o-Xylene	++	++	++	++	++	++	+/-	+	+	+
m-Xylene	+	++	+	++	+	+	++	++	-	+
p-Xylene	+	+	++	++	+	+	+	++	+	++
sum of m- and p-Xylenes	++	++	++	++	++	++	++	++	+	+
Total mixed-Xylenes	++	++	++	-- **	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
iso-Propylbenzene	-	+/-	+	-	-	-	+/-	--	-	-
sum of $C9^+$ aromatics	--	--	-	-/+	-	+/-	++	--	n.e.	n.e.
Non-aromatics	--	-	-	-	-	+/-	+	-	--	--

Table 8: comparison of determinations to the reference test methods

*) Another target test method was used (ASTM D2360 or ASTM D6563)

**) Results are outside application range of test method

The following performance categories were used:

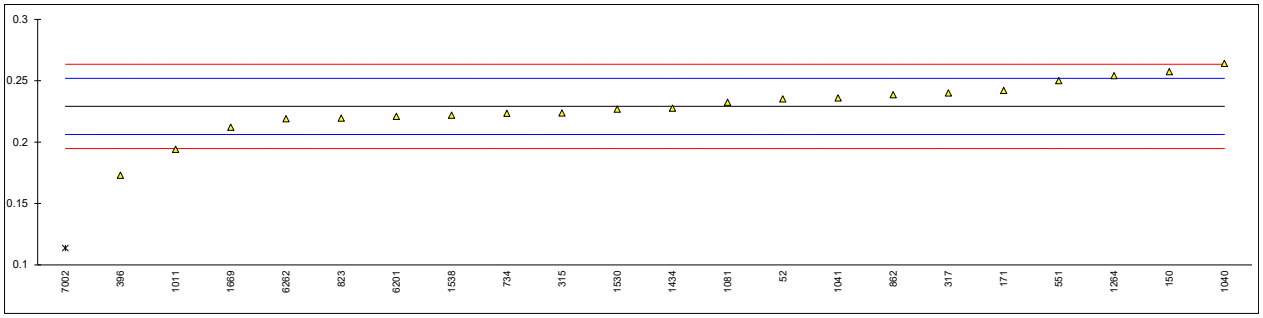
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

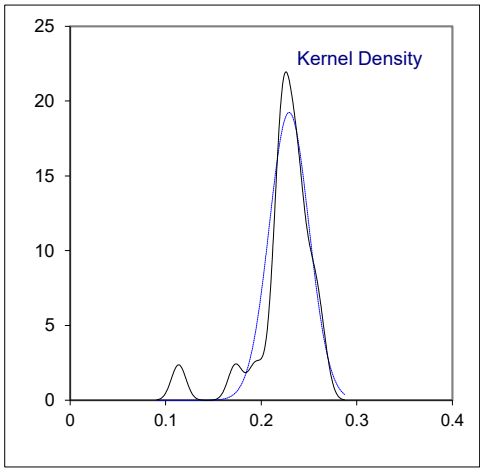
APPENDIX 1

Determination of Benzene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.2352		0.53	
150	D7504	0.2573		2.47	
171	D7504	0.2420		1.13	
315	D7504	0.2236		-0.48	
317	D7504	0.2400		0.95	
323		-----		-----	
396	D7504	0.173		-4.90	
445		-----		-----	
551	D7504	0.25		1.83	
558		-----		-----	
734	D7504	0.22337		-0.50	
823	D7504	0.2195		-0.84	
862	D7504	0.2385	C	0.82	first reported 0.2292
913		-----		-----	
1011	D5917	0.194		-3.07	
1040	D7504	0.264		3.05	
1041	D6563	0.236		0.60	
1081	D6563	0.2323		0.28	
1264	D7504	0.254		2.18	
1434		0.22762		-0.13	
1530	D7504	0.2268		-0.20	
1538	D5134	0.2218		-0.64	
1669		0.212		-1.49	
1812		-----		-----	
6201	D7504	0.2210	C	-0.71	0.0039
6262	D7504	0.2189		-0.89	
6412		-----		-----	
7002	D7504	0.1136	R(0.01)	-10.10	

normality	suspect
n	21
outliers	1
mean (n)	0.22909
st.dev. (n)	0.020732
R(calc.)	0.05805
st.dev.(Horwitz)	0.011439
R(Horwitz)	0.03203
Compare:	
R(D7504:23)	0.53454

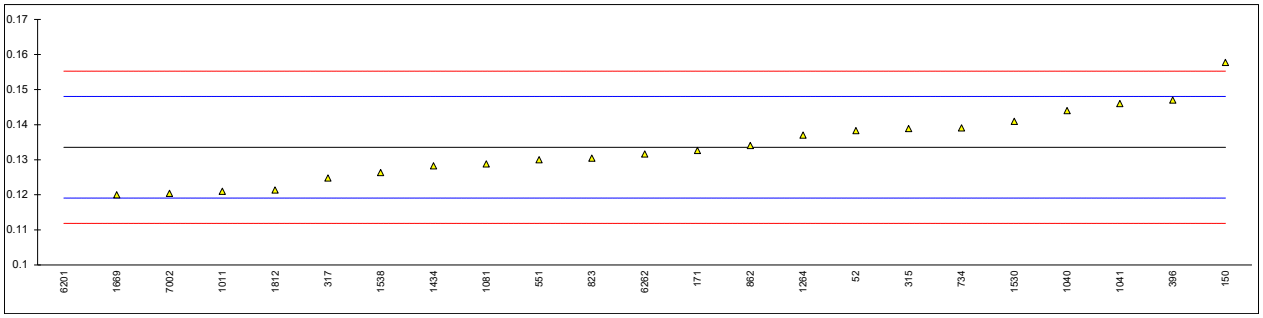


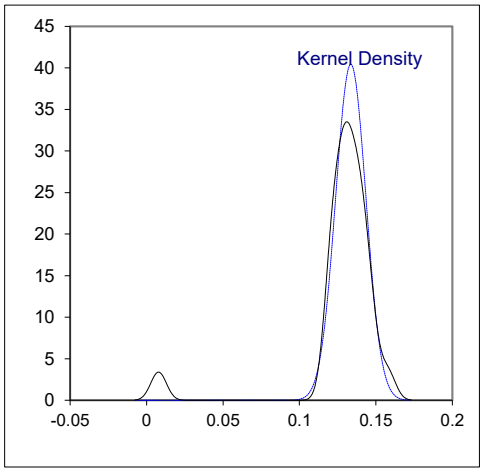


Determination of Toluene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.1383		0.65	
150	D7504	0.1577		3.34	
171	D7504	0.1326		-0.13	
315	D7504	0.1389		0.74	
317	D7504	0.1248		-1.21	
323		-----		-----	
396	D7504	0.147		1.86	
445		-----		-----	
551	D7504	0.13		-0.49	
558		-----		-----	
734	D7504	0.13906		0.76	
823	D7504	0.1304		-0.44	
862	D7504	0.1340	C	0.06	first reported 0.1313
913		-----		-----	
1011	D5917	0.121		-1.74	
1040	D7504	0.144		1.44	
1041	D6563	0.146		1.72	
1081	D6563	0.1288		-0.66	
1264	D7504	0.137		0.48	
1434		0.12825		-0.73	
1530	D7504	0.1409		1.01	
1538	D5134	0.1263		-1.00	
1669		0.12	C	-1.88	first reported 0.18
1812	D4367	0.12138		-1.68	
6201	D7504	0.0078	C,R(0.01)	-17.39	first reported 0.0109
6262	D7504	0.1316	C	-0.27	first reported 0.0149
6412		-----		-----	
7002	D7504	0.1204		-1.82	

normality	OK
n	22
outliers	1
mean (n)	0.13356
st.dev. (n)	0.009869
R(calc.)	0.02763
st.dev.(Horwitz)	0.007233
R(Horwitz)	0.02025
Compare:	
R(D7504:23)	0.31515

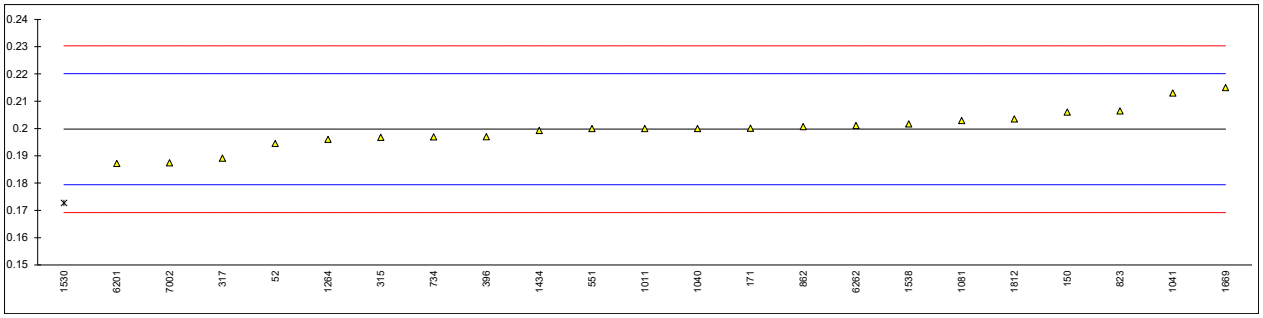


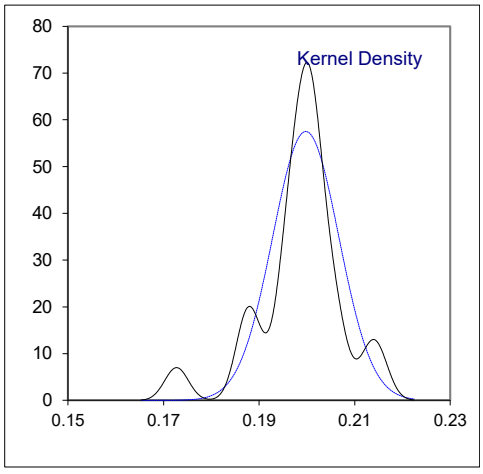


Determination of Ethylbenzene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.1945		-0.52	
150	D7504	0.2060		0.61	
171	D7504	0.2001		0.03	
315	D7504	0.1968		-0.29	
317	D7504	0.1891	C	-1.05	first reported 0.1827
323		-----		-----	
396	D7504	0.197		-0.27	
445		-----		-----	
551	D7504	0.20		0.02	
558		-----		-----	
734	D7504	0.19692		-0.28	
823	D7504	0.2064		0.65	
862	D7504	0.2007	C	0.09	first reported 0.1963
913		-----		-----	
1011	D5917	0.20		0.02	
1040	D7504	0.200		0.02	
1041	D6563	0.213		1.30	
1081	D6563	0.2029		0.31	
1264	D7504	0.196		-0.37	
1434		0.19928		-0.05	
1530	D7504	0.1727	R(0.05)	-2.66	
1538	D7504	0.2017		0.19	
1669		0.215		1.50	
1812	D7504	0.20347		0.37	
6201	D7504	0.1872	C	-1.23	first reported 9.8377
6262	D7504	0.2011		0.13	
6412		-----		-----	
7002	D7504	0.1874		-1.21	

normality	OK
n	22
outliers	1
mean (n)	0.19975
st.dev. (n)	0.006940
R(calc.)	0.01943
st.dev.(Horwitz)	0.010182
R(Horwitz)	0.02851
Compare:	
R(D7504:23)	0.00655

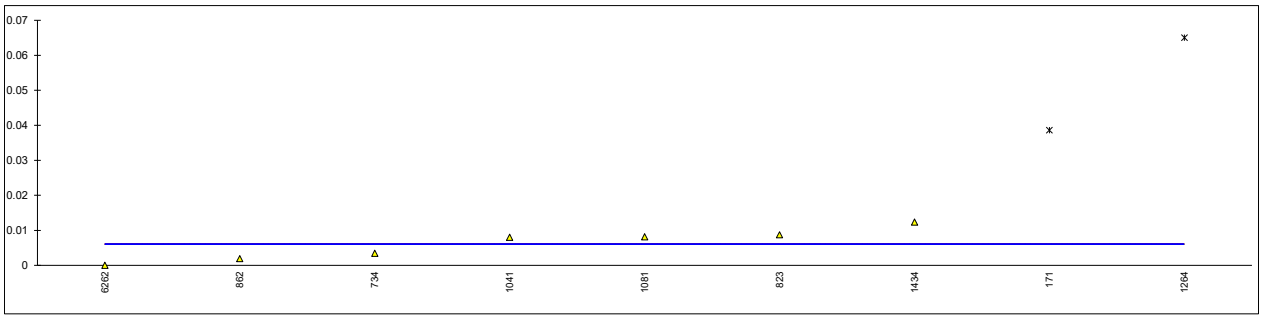


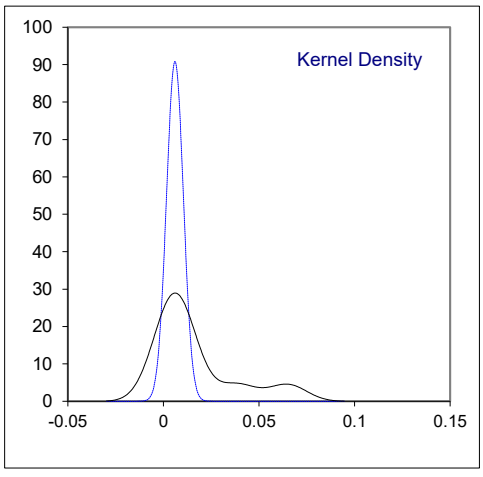


Determination of p-Diethylbenzene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150		-----		-----	
171	D7504	0.0386	G(0.01)	-----	
315		-----		-----	
317		-----		-----	
323		-----		-----	
396		-----		-----	
445		-----		-----	
551		-----		-----	
558		-----		-----	
734	D7504	0.00341		-----	
823	D7504	0.0087		-----	
862	D7504	0.0019	C	-----	first reported 0.0398
913		-----		-----	
1011		-----		-----	
1040		-----		-----	
1041	D6563	0.008		-----	
1081	D6563	0.0081		-----	
1264	D7504	0.065	G(0.05)	-----	
1434		0.01236		-----	
1530		-----		-----	
1538		-----		-----	
1669		-----		-----	
1812		-----		-----	
6201		-----		-----	
6262	D7504	0.000		-----	
6412		-----		-----	
7002		-----		-----	

normality	OK
n	7
outliers	2
mean (n)	0.00607
st.dev. (n)	0.004390
R(calc.)	0.01229
st.dev.(Horwitz)	(0.000523)
R(Horwitz)	(0.00147)

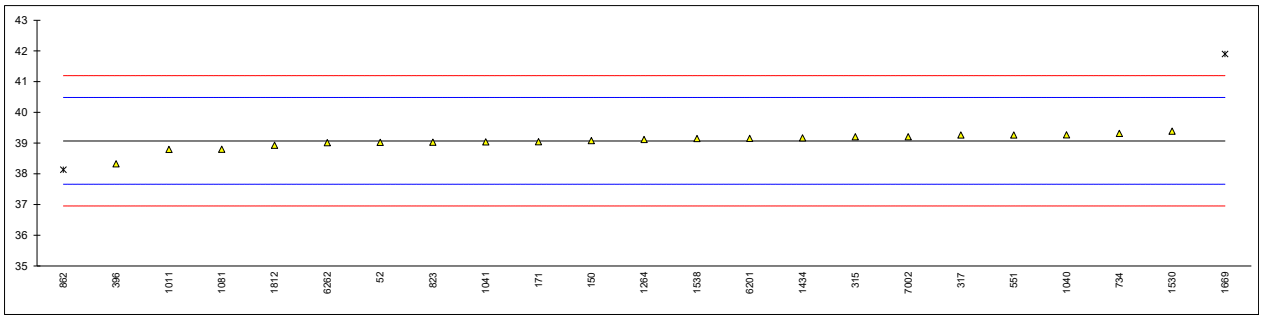


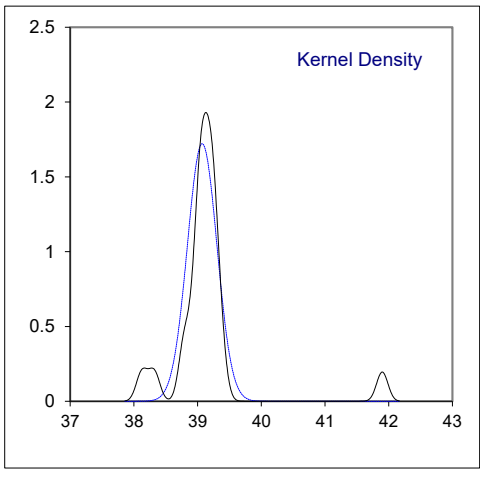


Determination of o-Xylene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	39.0250		-0.07	
150	D7504	39.0812		0.01	
171	D7504	39.0434		-0.04	
315	D7504	39.2058		0.19	
317	D7504	39.26		0.26	
323		-----		-----	
396	D7504	38.32		-1.07	
445		-----		-----	
551	D7504	39.26		0.26	
558		-----		-----	
734	D7504	39.31112		0.34	
823	D7504	39.0260		-0.07	
862	D7504	38.1282	C,R(0.05)	-1.34	first reported 39.2887
913		-----		-----	
1011	D5917	38.79		-0.40	
1040	D7504	39.268		0.28	
1041	D6563	39.036		-0.05	
1081	D6563	38.80		-0.39	
1264	D7504	39.113		0.06	
1434		39.16739		0.13	
1530	D7504	39.3842		0.44	
1538	D7504	39.1470		0.10	
1669		41.90	C,R(0.01)	4.00	first reported 41.847
1812	D7504	38.92733		-0.21	
6201	D7504	39.1540	C	0.11	first reported 20.3289
6262	D7504	39.0121		-0.09	
6412		-----		-----	
7002	D7504	39.2081		0.19	

normality	not OK
n	21
outliers	2
mean (n)	39.07332
st.dev. (n)	0.231659
R(calc.)	0.64865
st.dev.(D7504:23)	0.706276
R(D7504:23)	1.97757

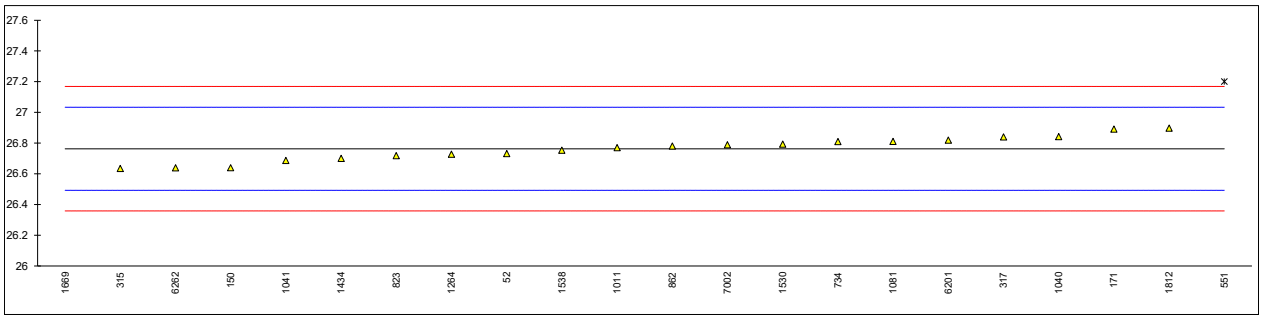


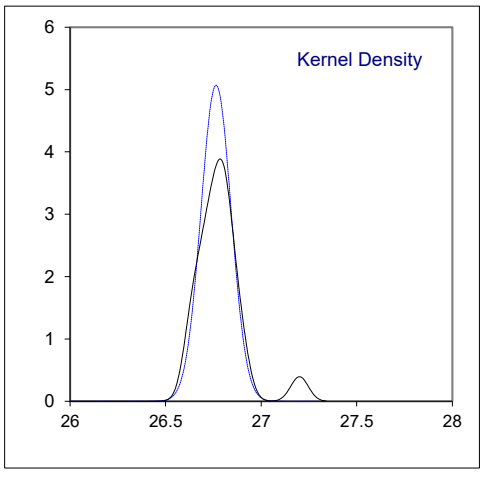


Determination of m-Xylene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	26.7311		-0.24	
150	D7504	26.6396		-0.92	
171	D7504	26.8910		0.94	
315	D7504	26.6345		-0.95	
317	D7504	26.84		0.57	
323		-----		-----	
396	D7504	<0.01	f-?	<-197.97	possibly a false negative test result?
445		-----		-----	
551	D7504	27.20	R(0.01)	3.23	
558		-----		-----	
734	D7504	26.80980		0.34	
823	D7504	26.7170		-0.34	
862	D7504	26.7802	C	0.12	first reported 32.1214
913		-----		-----	
1011	D5917	26.77		0.05	
1040	D7504	26.842		0.58	
1041	D6563	26.687		-0.57	
1081	D6563	26.81		0.34	
1264	D7504	26.727		-0.27	
1434		26.69985		-0.47	
1530	D7504	26.7932		0.22	
1538	In house	26.7531		-0.08	
1669		24.81	C,R(0.01)	-14.45	first reported 24.706
1812	D7504	26.89713		0.99	
6201	D7504	26.8188	C	0.41	first reported 40.3576
6262	D7504	26.6383		-0.93	
6412		-----		-----	
7002	D7504	26.7888		0.19	

normality	OK
n	20
outliers	2
mean (n)	26.76342
st.dev. (n)	0.078659
R(calc.)	0.22025
st.dev.(D7504:23)	0.135141
R(D7504:23)	0.37840

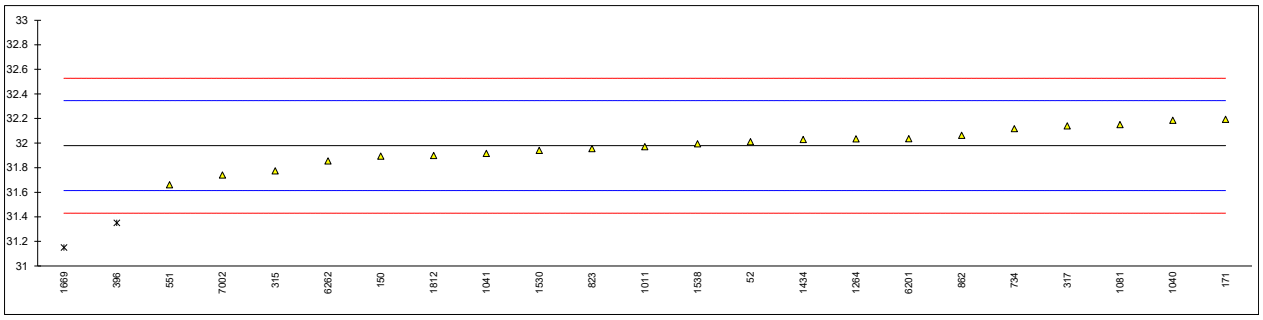


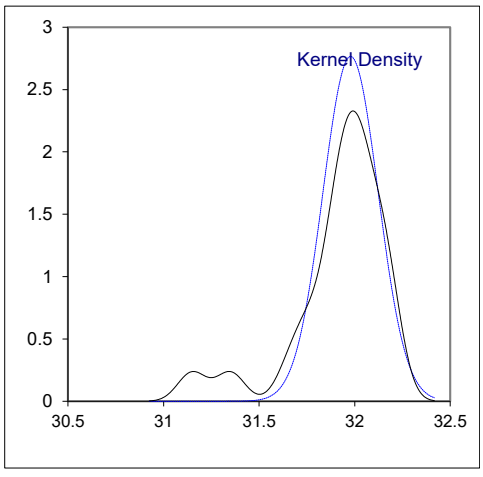


Determination of p-Xylene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	32.0110		0.18	
150	D7504	31.8930		-0.47	
171	D7504	32.1925		1.17	
315	D7504	31.7737		-1.12	
317	D7504	32.14		0.88	
323		-----		-----	
396	D7504	31.35	R(0.01)	-3.43	
445		-----		-----	
551	D7504	31.66		-1.74	
558		-----		-----	
734	D7504	32.11740		0.76	
823	D7504	31.9554		-0.13	
862	D7504	32.0629	C	0.46	first reported 26.8324
913		-----		-----	
1011	D5917	31.97		-0.05	
1040	D7504	32.186		1.13	
1041	D6563	31.915		-0.35	
1081	D6563	32.15		0.94	
1264	D7504	32.035		0.31	
1434		32.02865		0.27	
1530	D7504	31.9409		-0.21	
1538	UOP744	31.9932		0.08	
1669		31.15	C,R(0.01)	-4.53	first reported 31.140
1812	D7504	31.89853		-0.44	
6201	D7504	32.0356	C	0.31	first reported 29.3243
6262	D7504	31.8545		-0.68	
6412		-----		-----	
7002	D7504	31.7402		-1.30	

normality	OK
n	21
outliers	2
mean (n)	31.97874
st.dev. (n)	0.144276
R(calc.)	0.40397
st.dev.(D7504:23)	0.183070
R(D7504:23)	0.51260

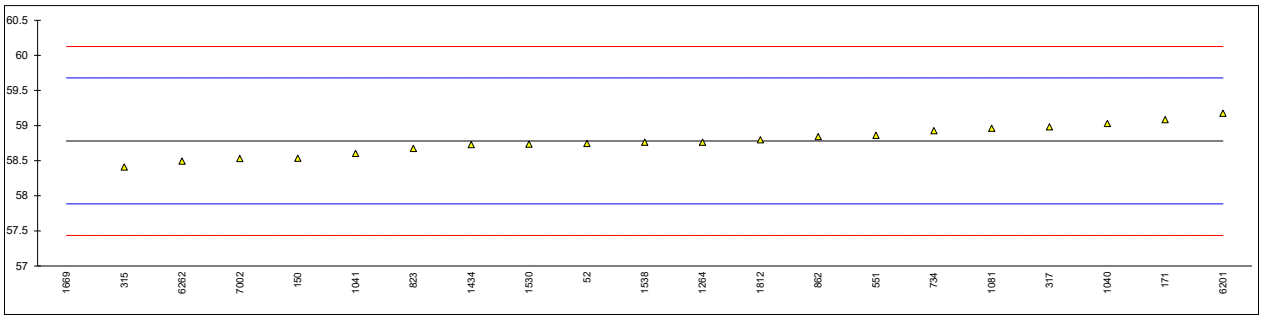


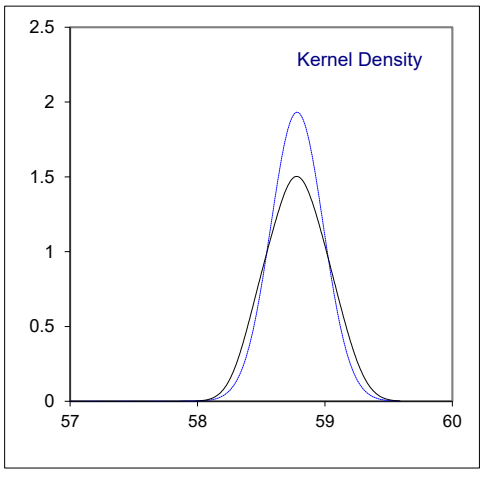


Determination of sum of m- and p-Xylene on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	58.7421		-0.09	
150	D7504	58.5326		-0.55	
171	D7504	59.0835		0.67	
315	D7504	58.4082		-0.83	
317	D7504	58.98		0.44	
323		-----		-----	
396		-----		-----	
445		-----		-----	
551	D7504	58.86		0.18	
558		-----		-----	
734	D7504	58.9272		0.33	
823	D7504	58.6724		-0.24	
862	D7504	58.8431	C	0.14	first reported 58.9538
913		-----		-----	
1011		-----		-----	
1040	D7504	59.028		0.55	
1041	D6563	58.601		-0.40	
1081	D6563	58.96		0.40	
1264	D7504	58.762		-0.04	
1434		58.7285		-0.12	
1530	D7504	58.7341		-0.10	
1538	D5134	58.7613		-0.04	
1669		55.96	C,R(0.01)	-6.29	first reported 55.846
1812	D7504	58.79566		0.03	
6201	D7504	59.1748	C,E	0.88	first reported 69.6819 / calculation difference, iis calc. 58.8544
6262	D7504	58.4928		-0.64	
6412		-----		-----	
7002	D7504	58.5290		-0.56	

normality	OK
n	20
outliers	1
mean (n)	58.78081
st.dev. (n)	0.206420
R(calc.)	0.57798
st.dev.(D7504:23)	0.448702
R(D7504:23)	1.25637



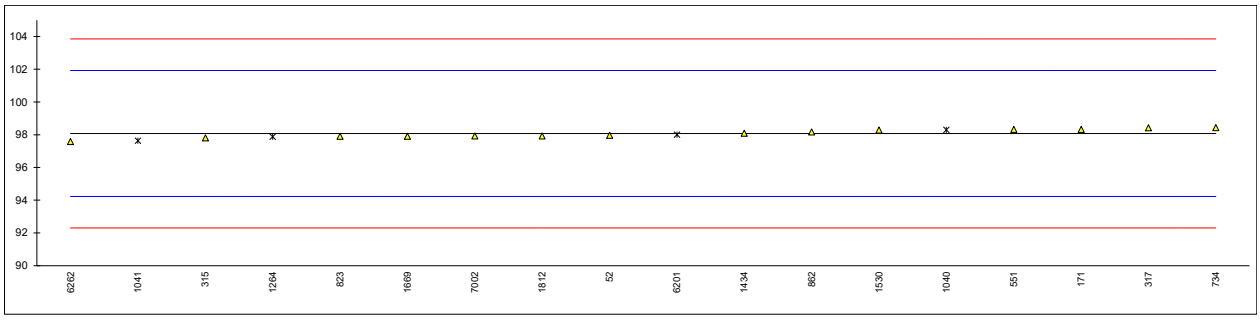


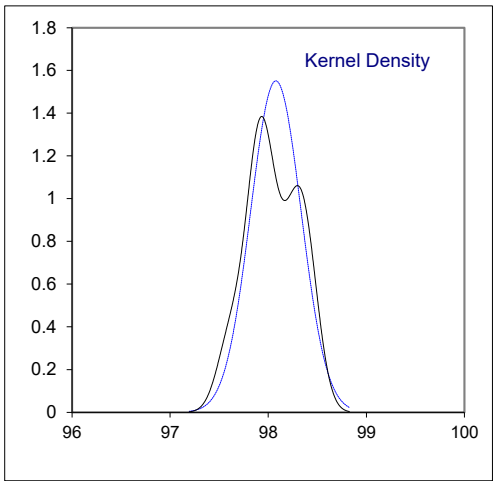
Determination of Total mixed-Xylenes on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	97.9616		-0.06	
150		-----		-----	
171	D7504	98.3270		0.13	
315	D7504	97.8108	C	-0.14	first reported 97.614
317	D7504	98.43		0.18	
323		-----		-----	
396		-----		-----	
445		-----		-----	
551	D7504	98.32		0.13	
558		-----		-----	
734	D7504	98.43524		0.19	
823	D7504	97.9048	C	-0.09	first reported 97.6984
862	D7504	98.1720	C,E	0.05	first reported 98.2425 / calculation difference, iis calc. 97.1720
913		-----		-----	
1011		-----		-----	
1040	D7504	98.296	ex,E	0.11	calculation difference, iis calc. 98.496
1041	D6563	97.637	ex,E	-0.23	calculation difference, iis calc. 97.851
1081		-----		-----	
1264	D7504	97.875	ex,E	-0.11	calculation difference, iis calc. 98.071
1434		98.09517		0.01	
1530	D7504	98.291		0.11	
1538		-----		-----	
1669		97.905	E	-0.09	calculation difference, iis calc. 98.075
1812	D7504	97.92646	C	-0.08	first reported 97.72299
6201	D7504	98.0084	C,ex,E	-0.04	first reported 90.0108 / calculation difference, iis calc. 98.1956
6262	D7504	97.5863	C,E	-0.26	first reported 97.5049 / calculation difference, iis calc. 97.7060
6412		-----		-----	
7002	D7504	97.9245		-0.08	

normality	OK
n	14
outliers	0 +4ex
mean (n)	98.07784
st.dev. (n)	0.257167
R(calc.)	0.72007
st.dev.(D7504:23)	1.924424
R(D7504:23)	5.38839

Total mixed Xylenes is the sum of m-Xylene, o-Xylene, p-Xylene and Ethylbenzene as per test method ASTM D7504:23 §15.1.2
Labs 1040, 1041, 1264 and 6201 test result excluded as Ethylbenzene was not included in the summation.

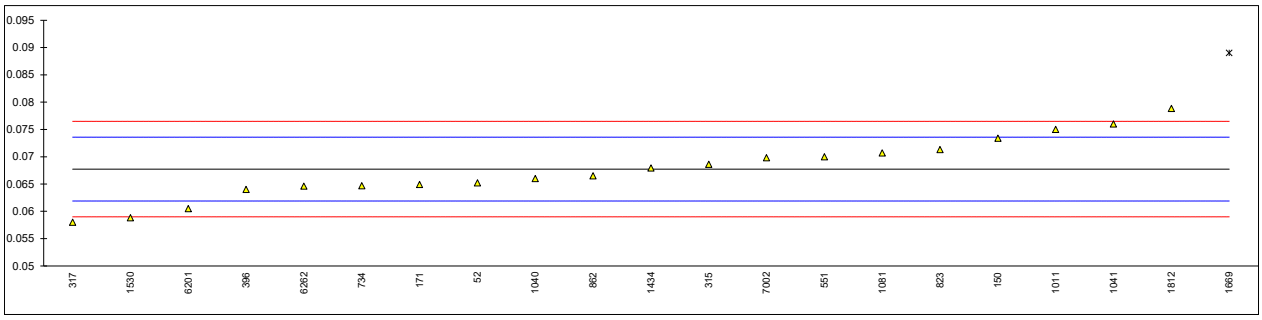


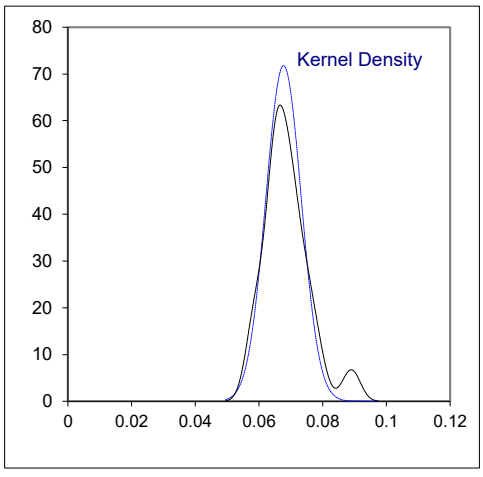


Determination of iso-Propylbenzene (Cumene) on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0652		-0.87	
150	D7504	0.0734		1.94	
171	D7504	0.0649		-0.97	
315	D7504	0.0686		0.30	
317	D7504	0.0580		-3.33	
323		-----		-----	
396	D7504	0.064		-1.28	
445		-----		-----	
551	D7504	0.07		0.78	
558		-----		-----	
734	D7504	0.06468		-1.05	
823	D7504	0.0713		1.22	
862	D7504	0.0665	C	-0.42	first reported 0.0649
913		-----		-----	
1011	D5917	0.075		2.49	
1040	D7504	0.066		-0.59	
1041	D6563	0.076		2.83	
1081	D6563	0.0707		1.02	
1264		-----		-----	
1434		0.06791		0.06	
1530	D7504	0.0588		-3.06	
1538		-----		-----	
1669		0.089	C,R(0.05)	7.28	first reported 0.09
1812	D7504	0.07882		3.80	
6201	D7504	0.0605	C	-2.48	first reported 0.0634
6262	D7504	0.0646		-1.07	
6412		-----		-----	
7002	D7504	0.0698		0.71	

normality	OK
n	20
outliers	1
mean (n)	0.06774
st.dev. (n)	0.005557
R(calc.)	0.01556
st.dev.(D7504:23)	0.002920
R(D7504:23)	0.00818

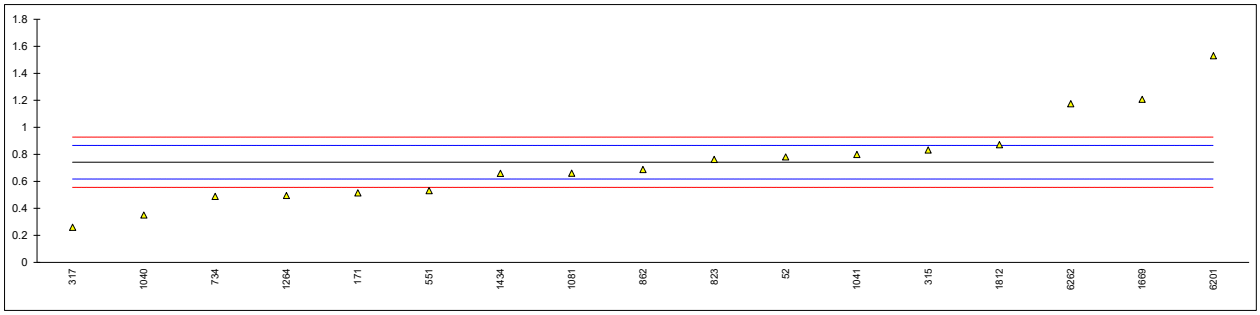


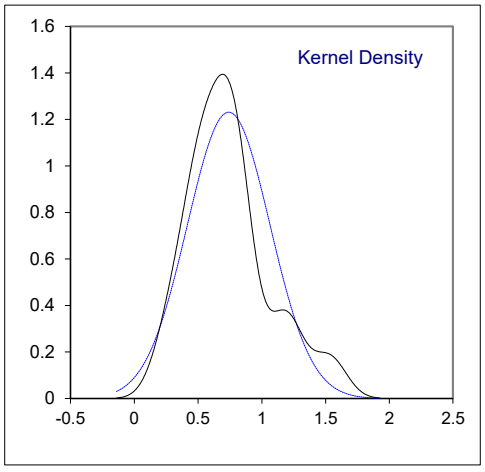


Determination of sum of C9 and heavier aromatics on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.7796		0.62	
150		-----		-----	
171	D7504	0.5146		-3.65	
315	D7504	0.832		1.47	
317	D7504	0.2592		-7.77	
323		-----		-----	
396		-----		-----	
445		-----		-----	
551	D7504	0.53		-3.40	
558		-----		-----	
734	D7504	0.48839		-4.07	
823	D7504	0.7620		0.34	
862	D7504	0.6868	C	-0.87	first reported 0.5918
913		-----		-----	
1011		-----		-----	
1040	D7504	0.350	C	-6.30	first reported 0.266
1041	D6563	0.799		0.94	
1081	D6563	0.66		-1.31	
1264	D7504	0.494		-3.98	
1434		0.65861		-1.33	
1530		-----		-----	
1538		-----		-----	
1669		1.207		7.51	
1812	D7504	0.87127		2.10	
6201		1.5300	C	12.72	first reported 0.0740
6262	D7504	1.1747		6.99	
6412		-----		-----	
7002		-----		-----	

normality	OK
n	17
outliers	0
mean (n)	0.74101
st.dev. (n)	0.324058
R(calc.)	0.90736
st.dev.(Horwitz 4 comp)	0.062017
R(Horwitz 4 comp)	0.17365
Compare:	
R(D7504:23)	0.41883

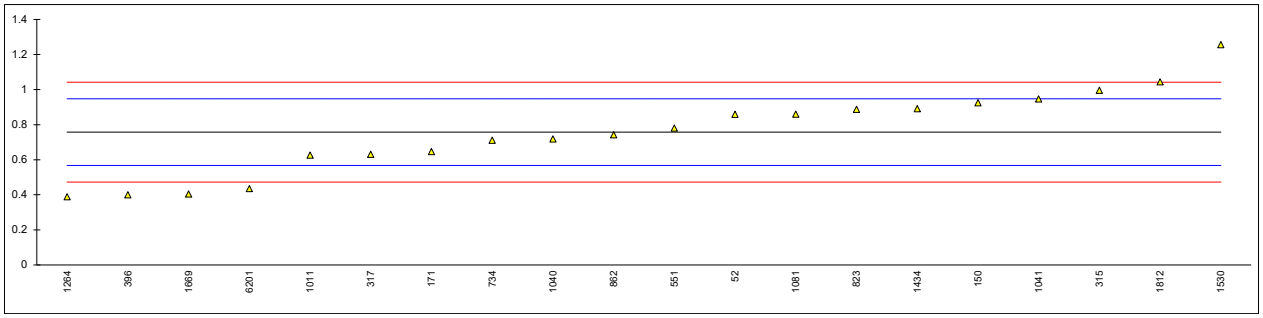


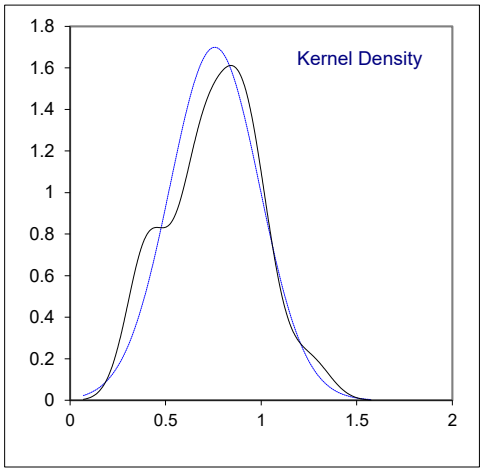


Determination of Non-aromatics on sample #23181; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.8588		1.07	
150	D7504	0.9236		1.76	
171	D7504	0.6463		-1.17	
315	D7504	0.9947		2.51	
317	D7504	0.6307		-1.33	
323		-----		-----	
396	D7504	0.40		-3.77	
445		-----		-----	
551	D7504	0.78		0.24	
558		-----		-----	
734	D7504	0.71054		-0.49	
823	D7504	0.8869		1.37	
862	D7504	0.7423	C	-0.16	first reported 0.5724
913		-----		-----	
1011	D5917	0.626		-1.38	
1040	D7504	0.718		-0.41	
1041	D6563	0.946		1.99	
1081	D6563	0.86		1.09	
1264	D7504	0.388		-3.90	
1434		0.89035		1.41	
1530	D7504	1.2559		5.27	
1538		-----		-----	
1669		0.404		-3.73	
1812	D7504	1.04328		3.02	
6201	D7504	0.4352	C	-3.40	first reported 0.0554
6262		-----		-----	
6412		-----		-----	
7002		-----		-----	

	normality	OK
	n	20
	outliers	0
	mean (n)	0.75703
	st.dev. (n)	0.234861
	R(calc.)	0.65761
	st.dev.(Horwitz 9 comp)	0.094730
	R(Horwitz 9 comp)	0.26524
Compare:		
	R(D7504:23)	0.08805

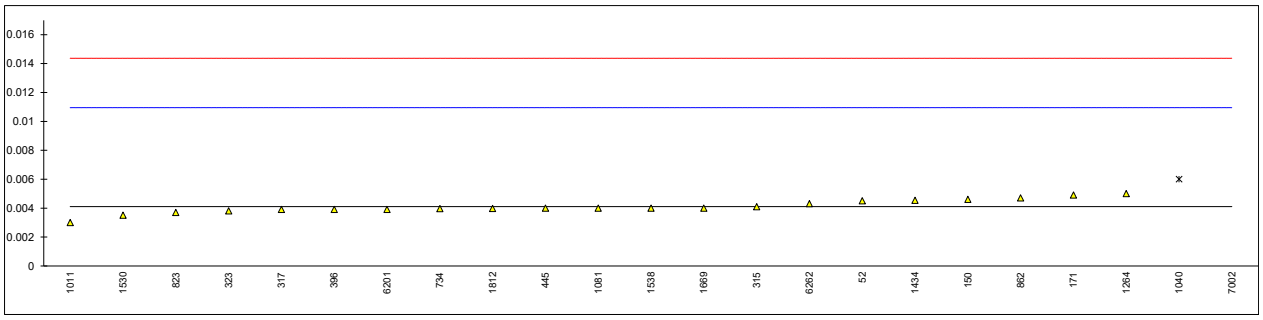


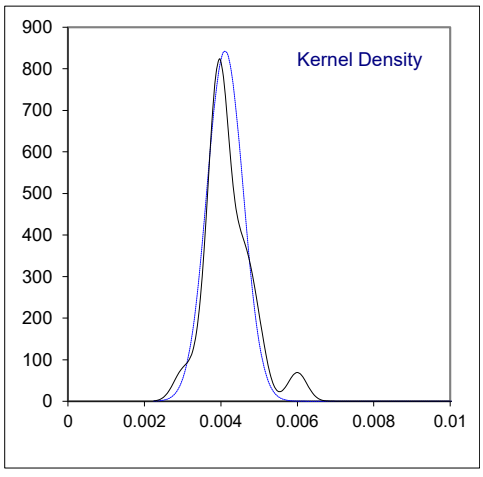


Determination of Benzene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0045	C	0.11	first reported 0.0043
150	D7504	0.0046		0.14	
171	D7504	0.0049		0.23	
315	D7504	0.0041		0.00	
317	D7504	0.0039		-0.06	
323	D7504	0.0038		-0.09	
396	D7504	0.0039		-0.06	
445	D2360	0.004		-0.03	
551	D7504	<0.01		-----	
558		-----		-----	
734	D7504	0.00396		-0.04	
823	D7504	0.0037		-0.12	
862	D7504	0.0047	C	0.17	first reported 0.0000
913		-----		-----	
1011	D5917	0.003		-0.32	
1040	D7504	0.006	R(0.05)	0.55	
1041		-----		-----	
1081	D6563	0.004		-0.03	
1264	D7504	0.005		0.26	
1434		0.00454		0.13	
1530	D7504	0.0035		-0.18	
1538	UOP931/543	0.0040		-0.03	
1669		0.004		-0.03	
1812	D4367	0.003975		-0.04	
6201	D7504	0.0039		-0.06	
6262	D7504	0.0043		0.06	
6412		-----		-----	
7002	D7504	0.0273	R(0.01)	6.77	

normality	OK
n	21
outliers	2
mean (n)	0.00411
st.dev. (n)	0.000473
R(calc.)	0.00132
st.dev.(D7504:23)	0.003424
R(D7504:23)	0.00959

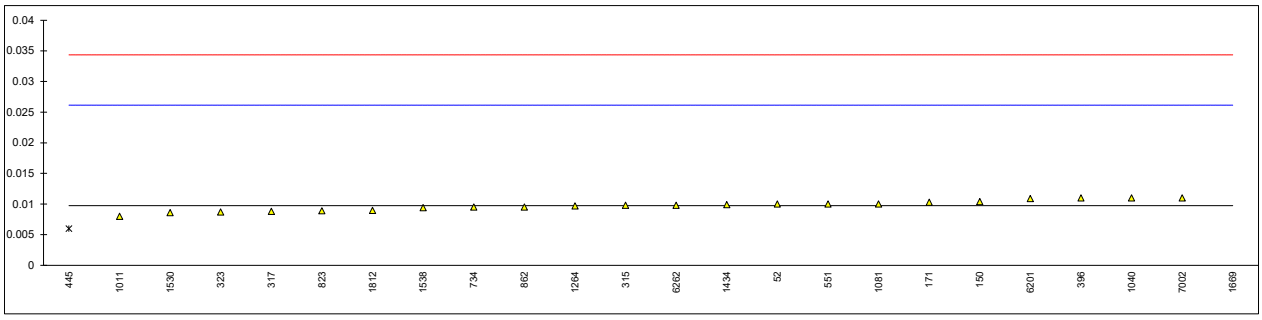


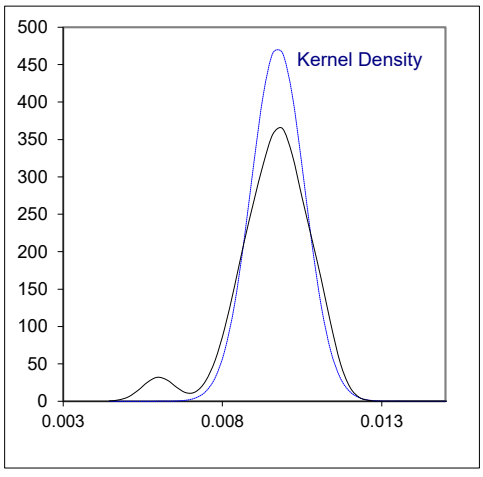


Determination of Toluene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0100	C	0.03	first reported 0.0098
150	D7504	0.0104		0.08	
171	D7504	0.0103		0.07	
315	D7504	0.0098		0.01	
317	D7504	0.0088		-0.11	
323	D7504	0.0087		-0.13	
396	D7504	0.011		0.15	
445	D2360	0.006	R(0.01)	-0.46	
551	D7504	0.01		0.03	
558		-----		-----	
734	D7504	0.00949		-0.03	
823	D7504	0.0089		-0.10	
862	D7504	0.0095	C	-0.03	first reported 0.0098
913		-----		-----	
1011	D5917	0.008		-0.21	
1040	D7504	0.011		0.15	
1041		-----		-----	
1081	D6563	0.010		0.03	
1264	D7504	0.0097		0.00	
1434		0.00990		0.02	
1530	D7504	0.0086		-0.14	
1538	D6729	0.0094		-0.04	
1669		0.08	C,R(0.01)	8.57	first reported 0.018
1812	D4367	0.008967		-0.09	
6201	D7504	0.0109		0.14	
6262	D7504	0.0098		0.01	
6412		-----		-----	
7002	D7504	0.0110		0.15	

normality	OK
n	22
outliers	2
mean (n)	0.00973
st.dev. (n)	0.000843
R(calc.)	0.00236
st.dev.(D7504:23)	0.008203
R(D7504:23)	0.02297

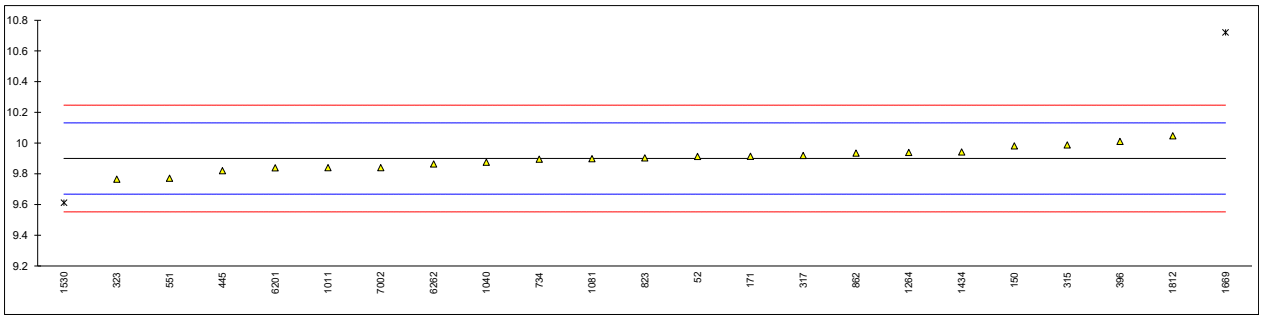


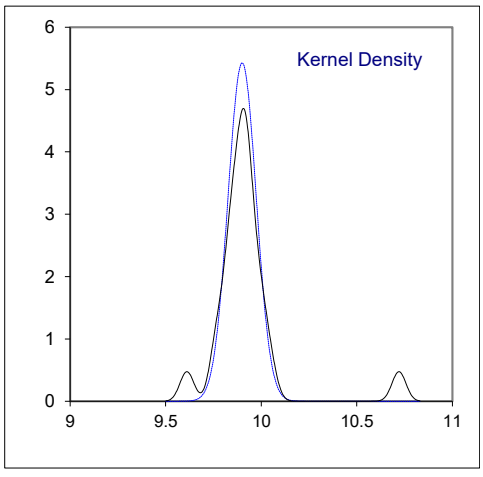


Determination of Ethylbenzene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	9.9126	C	0.11	first reported 9.8957
150	D7504	9.9809		0.70	
171	D7504	9.9136		0.12	
315	D7504	9.9879		0.76	
317	D7504	9.9187		0.16	
323	D7504	9.7642		-1.17	
396	D7504	10.01		0.95	
445	D6563	9.82		-0.69	
551	D7504	9.77		-1.12	
558		-----		-----	
734	D7504	9.89554		-0.04	
823	D7504	9.9025		0.02	
862	D7504	9.9346	C	0.30	first reported 9.9357
913		-----		-----	
1011	D5917	9.84		-0.51	
1040	D7504	9.875		-0.21	
1041		-----		-----	
1081	D6563	9.898		-0.01	
1264	D7504	9.939		0.34	
1434		9.94212		0.37	
1530	D7504	9.6107	R(0.05)	-2.49	
1538		-----		-----	
1669		10.72	C,R(0.01)	7.08	first reported 10.741
1812	D7504	10.04742		1.27	
6201	D7504	9.8377		-0.53	
6262	D7504	9.8631		-0.32	
6412		-----		-----	
7002	D7504	9.8403		-0.51	

normality	OK
n	21
outliers	2
mean (n)	9.89968
st.dev. (n)	0.073516
R(calc.)	0.20584
st.dev.(D7504:23)	0.115939
R(D7504:23)	0.32463





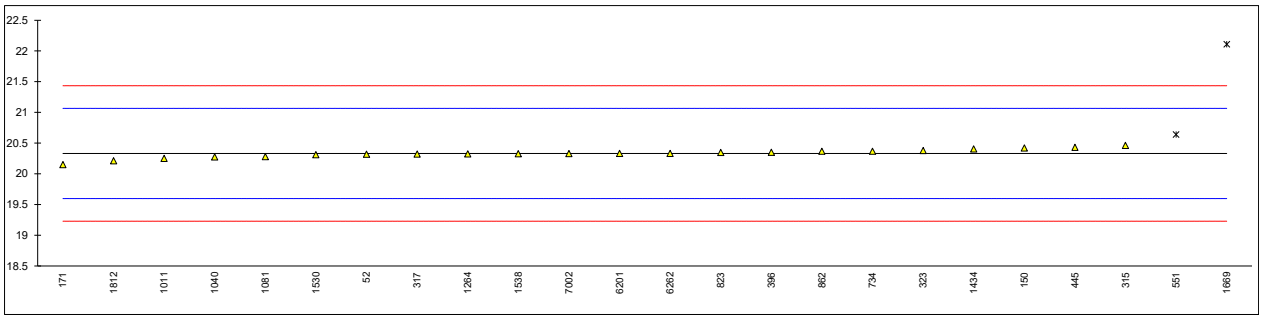
Determination of p-Diethylbenzene on sample #23182; results in %M/M

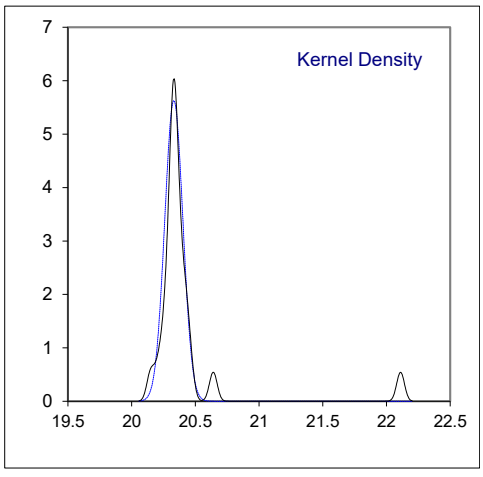
lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150		-----		-----	
171	D7504	<0.0002		-----	
315		-----		-----	
317		-----		-----	
323		-----		-----	
396		-----		-----	
445		-----		-----	
551		-----		-----	
558		-----		-----	
734	D7504	0.0000		-----	
823	D7504	<0.0002		-----	
862	D7504	0.0000		-----	
913		-----		-----	
1011		-----		-----	
1040		-----		-----	
1041		-----		-----	
1081	D6563	0		-----	
1264	D7504	0.067		-----	
1434		0.0000		-----	
1530		-----		-----	
1538		0.00006		-----	
1669		-----		-----	
1812		-----		-----	
6201		-----		-----	
6262	D7504	0.0000		-----	
6412		-----		-----	
7002		0.0000		-----	
	n	9			
	mean (n)	<0.0002			

Determination of o-Xylene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	20.3178	C	-0.03	first reported 20.3387
150	D7504	20.4186		0.24	
171	D7504	20.1495		-0.49	
315	D7504	20.4594		0.35	
317	D7504	20.32		-0.03	
323	D7504	20.3774		0.13	
396	D7504	20.35		0.05	
445	D6563	20.43		0.27	
551	D7504	20.64	C,R(0.01)	0.84	first reported 29.06
558		-----		-----	
734	D7504	20.36740		0.10	
823	D7504	20.3470		0.05	
862	D7504	20.3655	C	0.10	first reported 20.3902
913		-----		-----	
1011	D5917	20.25		-0.22	
1040	D7504	20.274		-0.15	
1041		-----		-----	
1081	D6563	20.28		-0.14	
1264	D7504	20.323		-0.02	
1434		20.40558		0.20	
1530	D7504	20.3104		-0.05	
1538	D6729	20.3253		-0.01	
1669		22.11	C,R(0.01)	4.84	first reported 22.088
1812	D7504	20.21036		-0.33	
6201	D7504	20.3289		0.00	
6262	D7504	20.3304		0.00	
6412		-----		-----	
7002	D7504	20.3286		0.00	

normality	suspect
n	22
outliers	2
mean (n)	20.33042
st.dev. (n)	0.070891
R(calc.)	0.19849
st.dev.(D7504:23)	0.367485
R(D7504:23)	1.02896

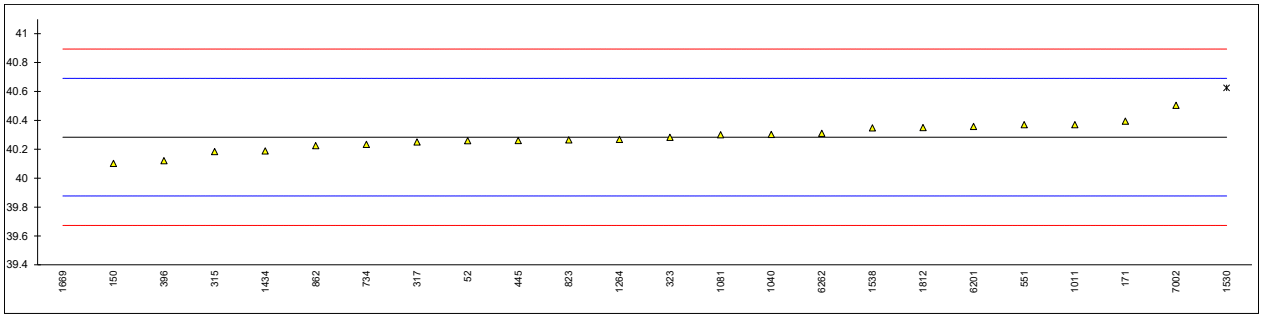


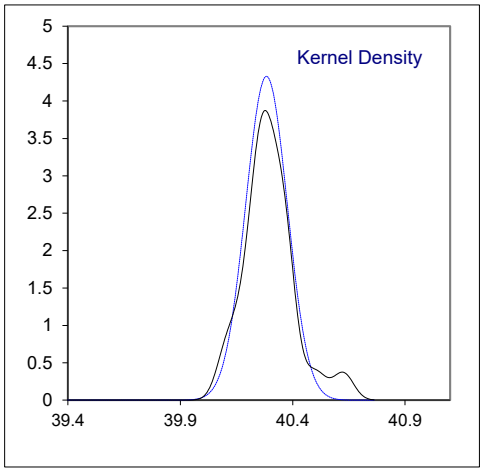


Determination of m-Xylene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	40.2587	C	-0.12	first reported 40.2594
150	D7504	40.1014		-0.90	
171	D7504	40.3935		0.54	
315	D7504	40.1843		-0.49	
317	D7504	40.25		-0.17	
323	D7504	40.2823		-0.01	
396	D7504	40.12		-0.80	
445	D6563	40.26		-0.12	
551	D7504	40.37		0.42	
558		-----		-----	
734	D7504	40.23359		-0.25	
823	D7504	40.2645		-0.09	
862	D7504	40.2247	C	-0.29	first reported 29.3279
913		-----		-----	
1011	D5917	40.37		0.42	
1040	D7504	40.302		0.09	
1041		-----		-----	
1081	D6563	40.30		0.08	
1264	D7504	40.268		-0.08	
1434		40.18750		-0.47	
1530	D7504	40.6247	R(0.05)	1.68	
1538	D7504	40.3478		0.32	
1669		38.01	C,R(0.01)	-11.18	first reported 37.768
1812	D7504	40.34984		0.33	
6201	D7504	40.3576		0.36	
6262	D7504	40.3107		0.13	
6412		-----		-----	
7002	D7504	40.5030		1.08	

normality	OK
n	22
outliers	2
mean (n)	40.28361
st.dev. (n)	0.092174
R(calc.)	0.25809
st.dev.(D7504:23)	0.203411
R(D7504:23)	0.56955

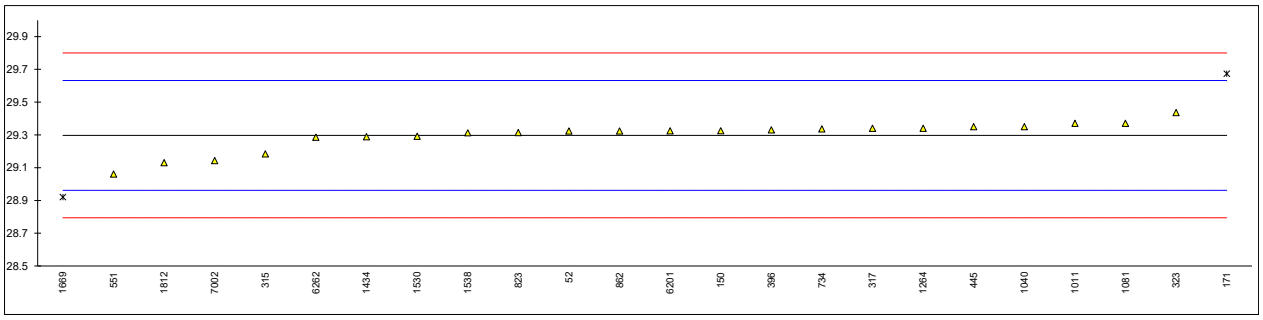


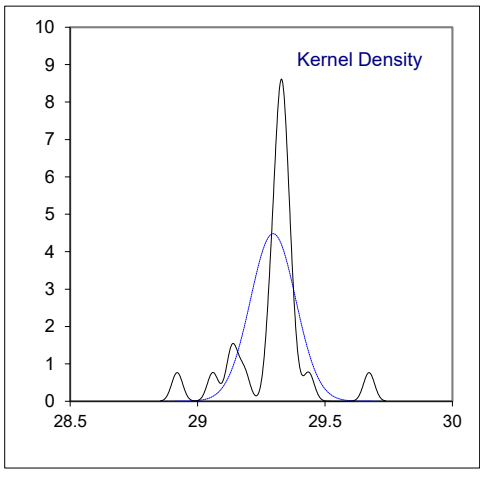


Determination of p-Xylene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	29.3229	C	0.16	first reported 29.3249
150	D7504	29.3251		0.17	
171	D7504	29.6731	R(0.05)	2.24	
315	D7504	29.1837		-0.67	
317	D7504	29.34		0.26	
323	D7504	29.4360		0.83	
396	D7504	29.33		0.20	
445	D6563	29.35		0.32	
551	D7504	29.06	C	-1.41	first reported 20.64
558		-----		-----	
734	D7504	29.33620		0.24	
823	D7504	29.3140		0.10	
862	D7504	29.3235	C	0.16	first reported 40.2143
913		-----		-----	
1011	D5917	29.37		0.44	
1040	D7504	29.350		0.32	
1041		-----		-----	
1081	D6563	29.37		0.44	
1264	D7504	29.340		0.26	
1434		29.28887		-0.05	
1530	D7504	29.2918		-0.03	
1538	D7504	29.3124		0.09	
1669		28.92	C,R(0.05)	-2.25	first reported 29.099
1812	D7504	29.12985	C	-0.99	first reported 29.14534
6201	D7504	29.3243		0.16	
6262	D7504	29.2855		-0.07	
6412		-----		-----	
7002	D7504	29.1430		-0.92	

normality	suspect
n	22
outliers	2
mean (n)	29.29668
st.dev. (n)	0.088973
R(calc.)	0.24912
st.dev.(D7504:23)	0.167716
R(D7504:23)	0.46961

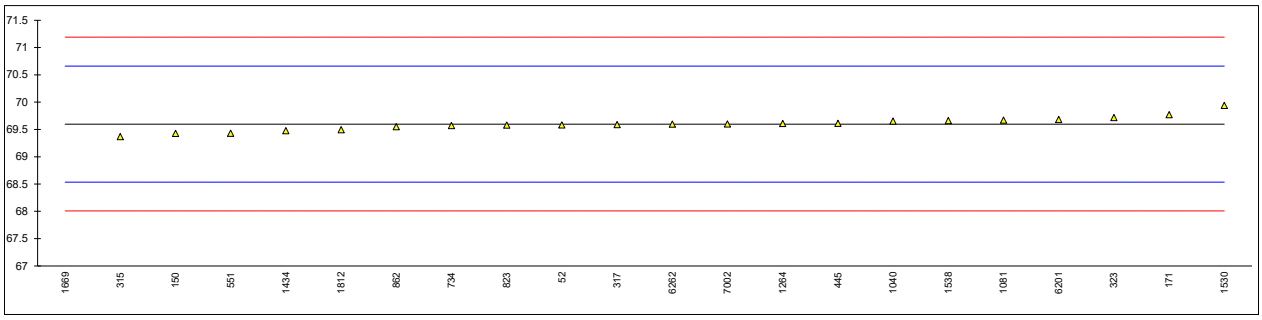


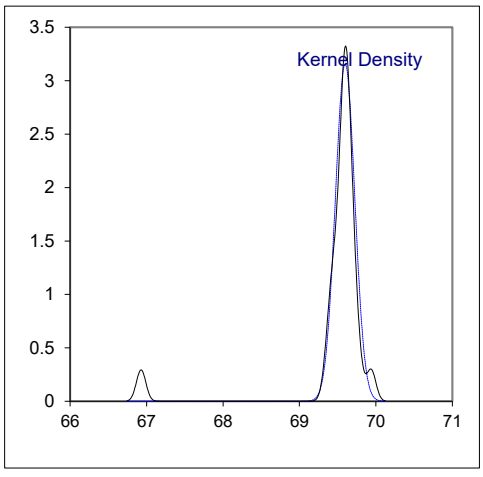


Determination of sum of m- and p-Xylene on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	69.5816	C	-0.03	first reported 69.5843
150	D7504	69.4265		-0.32	
171	D7504	69.7696	E	0.32	calculation difference, iis calculated 70.0666
315	D7504	69.3680		-0.43	
317	D7504	69.59		-0.02	
323	D7504	69.7183		0.23	
396		-----		-----	
445	D6563	69.61		0.02	
551	D7504	69.43	C	-0.32	first reported 61.01
558		-----		-----	
734	D7504	69.56979		-0.05	
823	D7504	69.5785		-0.04	
862	D7504	69.5481	C	-0.09	first reported 69.5422
913		-----		-----	
1011		-----		-----	
1040	D7504	69.652		0.10	
1041		-----		-----	
1081	D6563	69.67		0.13	
1264	D7504	69.609		0.02	
1434		69.47637		-0.23	
1530	D7504	69.9388		0.64	
1538	D5134	69.6587		0.11	
1669		66.93	C,R(0.01)	-5.02	first reported 66.867
1812	D7504	69.49518		-0.19	
6201	D7504	69.6819		0.16	
6262	D7504	69.5962		0.00	
6412		-----		-----	
7002	D7504	69.6006		0.00	

normality	suspect
n	21
outliers	1
mean (n)	69.59853
st.dev. (n)	0.126305
R(calc.)	0.35365
st.dev.(D7504:23)	0.531279
R(D7504:23)	1.48758



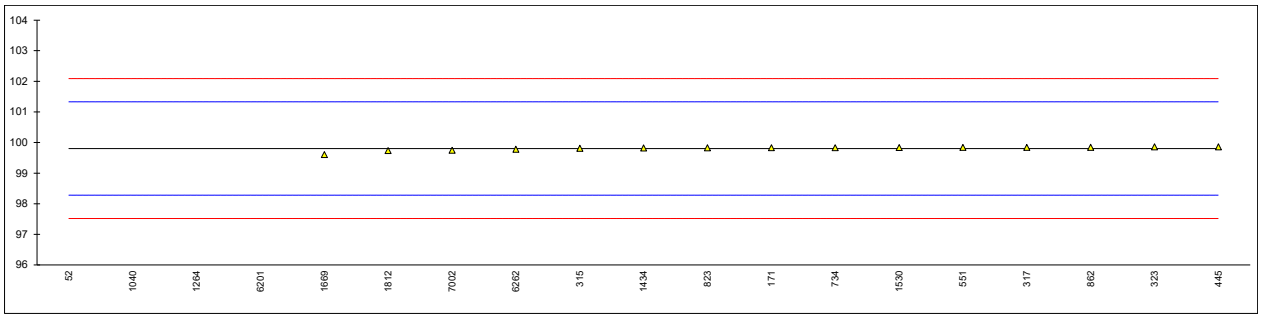


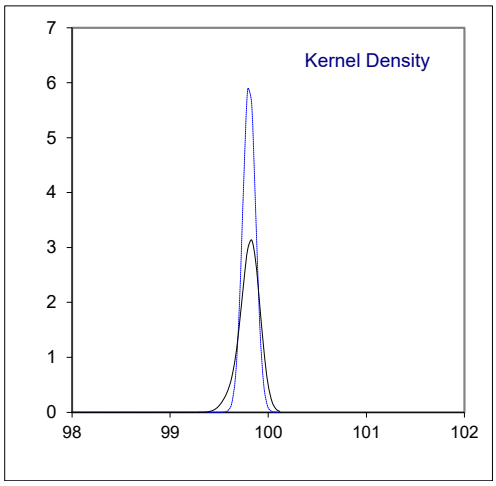
Determination of Total mixed-Xylenes on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	89.8994	C,ex,E	-13.00	first reported 89.9230 / calculation diff., iis calc. 99.8120
150		-----		-----	
171	D7504	99.8327	E	0.03	calculation diff., iis calc. 100.1297
315	D7504	99.8153	C	0.01	first reported 89.8274
317	D7504	99.84		0.04	
323	D7504	99.8599		0.07	
396		-----		-----	
445	D6563	99.86		0.07	
551	D7504	99.84		0.04	
558		-----		-----	
734	D7504	99.83272		0.03	
823	D7504	99.8280	C	0.03	first reported 89.9255
862	D7504	99.8483	C	0.06	first reported 89.9323
913		-----		-----	
1011		-----		-----	
1040	D7504	89.926	ex,E	-12.97	calculation diff., iis calc. 99.801
1041		-----		-----	
1081		-----		-----	
1264	D7504	89.932	ex,E	-12.96	calculation diff., iis calc. 99.870
1434		99.82407		0.02	
1530	D7504	99.8376		0.04	
1538		-----		-----	
1669		99.608		-0.26	
1812	D7504	99.73747	C	-0.09	first reported 89.70554
6201	D7504	90.0108	ex,E	-12.86	calculation diff., iis calc. 99.8485
6262	D7504	99.7820	C	-0.03	first reported 89.9266
6412		-----		-----	
7002	D7504	99.7498		-0.07	

normality	not OK
n	15
outliers	0 +4ex
mean (n)	99.80638
st.dev. (n)	0.065942
R(calc.)	0.18464
st.dev.(D7504:23)	0.761870
R(D7504:23)	2.13324

Total mixed Xylenes is the sum of m-Xylene, o-Xylene, p-Xylene and Ethylbenzene as per test method ASTM D7504:23 §15.1.2
Labs 52, 1040, 1264 and 6201 test result excluded as Ethylbenzene was not included in the summation.

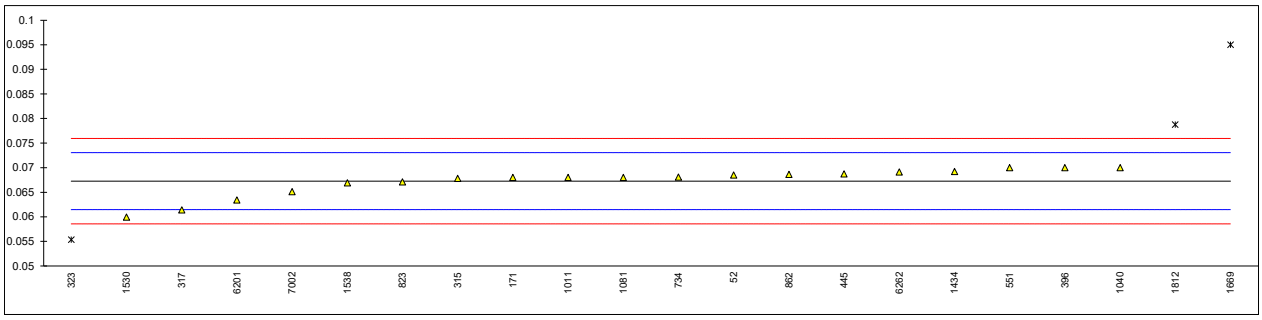


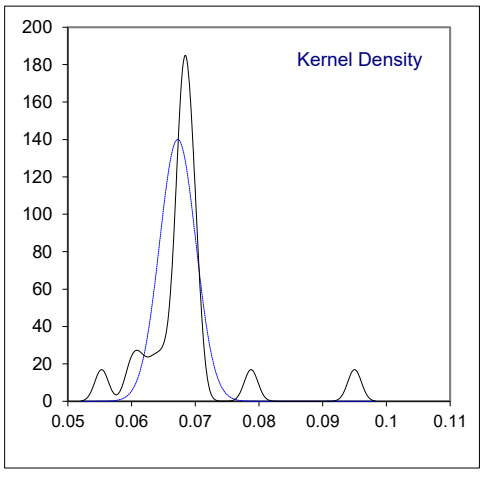


Determination of iso-Propylbenzene (Cumene) on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0685	C	0.43	first reported 0.0672
150		-----		-----	
171	D7504	0.0680		0.26	
315	D7504	0.0678		0.19	
317	D7504	0.0614		-2.02	
323	D7504	0.0553	R(0.05)	-4.12	
396	D7504	0.070		0.95	
445	D2360	0.0687		0.50	
551	D7504	0.07		0.95	
558		-----		-----	
734	D7504	0.06806		0.28	
823	D7504	0.0671		-0.05	
862	D7504	0.0686	C	0.47	first reported 0.0688
913		-----		-----	
1011	D5917	0.068		0.26	
1040	D7504	0.070		0.95	
1041		-----		-----	
1081	D6563	0.068		0.26	
1264		-----		-----	
1434		0.06922		0.68	
1530	D7504	0.0599		-2.54	
1538	D6730	0.0669		-0.12	
1669		0.095	C,R(0.01)	9.57	first reported 0.089
1812	D7504	0.07876	C,R(0.05)	3.97	first reported 0.08141
6201	D7504	0.0634		-1.33	
6262	D7504	0.0691		0.64	
6412		-----		-----	
7002	D7504	0.0651		-0.74	

normality	suspect
n	19
outliers	3
mean (n)	0.06725
st.dev. (n)	0.002848
R(calc.)	0.00797
st.dev.(D7504:23)	0.002899
R(D7504:23)	0.00812

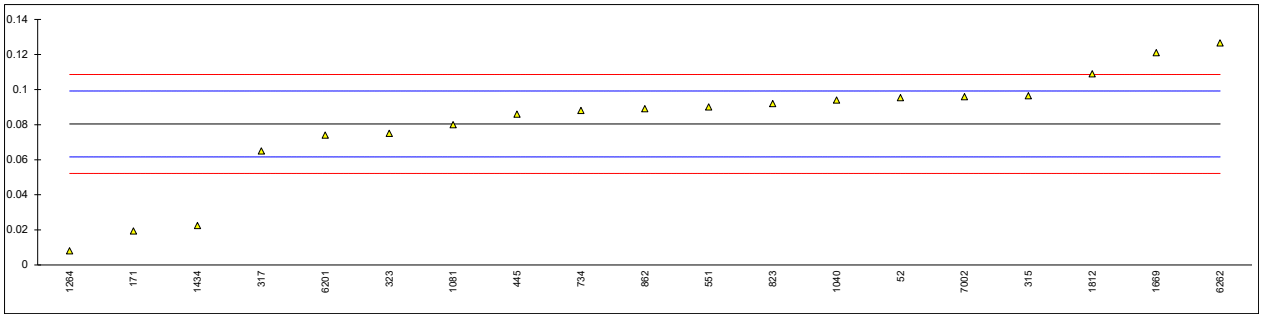


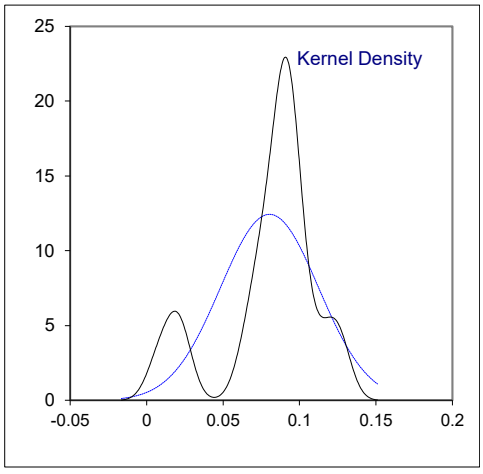


Determination of sum of C9 and heavier aromatics on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0954	C	1.60	first reported 0.0916
150		-----		-----	
171	D7504	0.0194		-6.49	
315	D7504	0.0965		1.72	
317	D7504	0.0650		-1.64	
323	D7504	0.0750		-0.57	
396		-----		-----	
445	D6563	0.086		0.60	
551	D7504	0.09		1.02	
558		-----		-----	
734	D7504	0.08809		0.82	
823	D7504	0.0920		1.24	
862	D7504	0.0890	C	0.92	first reported 0.0853
913		-----		-----	
1011		-----		-----	
1040	D7504	0.094	C	1.45	first reported 0.019
1041		-----		-----	
1081	D6563	0.080		-0.04	
1264	D7504	0.008		-7.70	
1434		0.02249		-6.16	
1530		-----		-----	
1538		-----		-----	
1669		0.121	C	4.32	first reported 0.136
1812	D7504	0.10887		3.03	
6201		0.0740		-0.68	
6262	D7504	0.1265		4.91	
6412		-----		-----	
7002	D7504	0.0959		1.65	

normality	OK
n	19
outliers	0
mean (n)	0.08038
st.dev. (n)	0.032066
R(calc.)	0.08979
st.dev.(Horwitz 4 comp)	0.009398
R(Horwitz 4 comp)	0.02631
Compare:	
R(D7504:23)	0.04543

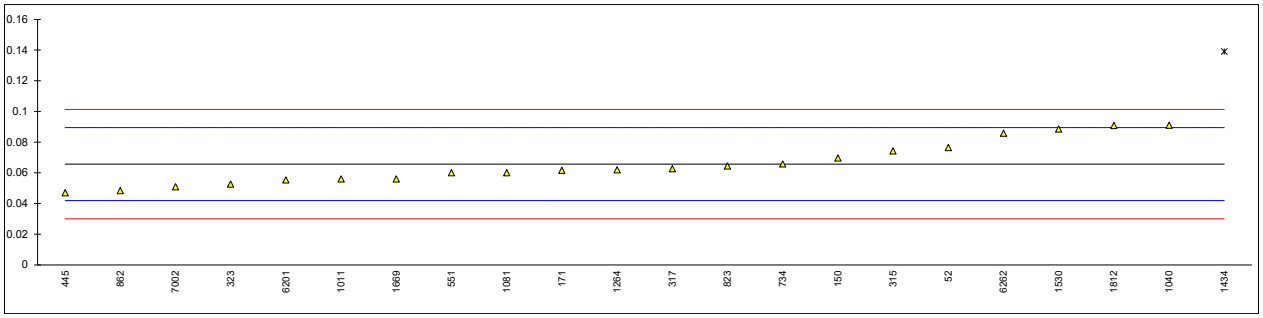


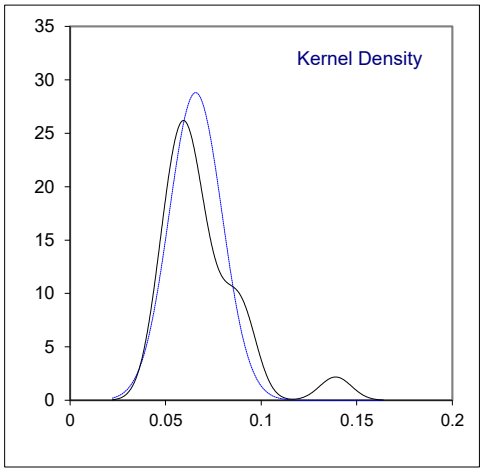


Determination of Non-aromatics on sample #23182; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0765	C	0.91	first reported 0.0742
150	D7504	0.0696		0.33	
171	D7504	0.0616		-0.34	
315	D7504	0.0743		0.72	
317	D7504	0.0627		-0.25	
323	D7504	0.0527		-1.09	
396		-----		-----	
445	D2360	0.047		-1.57	
551	D7504	0.06		-0.48	
558		-----		-----	
734	D7504	0.06574		0.00	
823	D7504	0.0645		-0.10	
862	D7504	0.0484	C	-1.46	first reported 0.0369
913		-----		-----	
1011	D5917	0.056		-0.82	
1040	D7504	0.091		2.13	
1041		-----		-----	
1081	D6563	0.060		-0.48	
1264	D7504	0.062		-0.31	
1434		0.1390	R(0.01)	6.17	
1530	D7504	0.0886		1.93	
1538		-----		-----	
1669		0.056		-0.82	
1812	D7504	0.09076		2.11	
6201	D7504	0.0554		-0.87	
6262	D7504	0.0858		1.69	
6412		-----		-----	
7002	D7504	0.0509		-1.25	

	normality	OK
	n	21
	outliers	1
	mean (n)	0.06569
	st.dev. (n)	0.013856
	R(calc.)	0.03880
	st.dev.(Horwitz 9 comp)	0.011876
	R(Horwitz 9 comp)	0.03325
Compare:		
	R(D7504:23)	0.00764





APPENDIX 2

Number of participants per country

2 labs in BELGIUM
2 labs in BRAZIL
1 lab in CANADA
1 lab in CHINA, People's Republic
4 labs in GERMANY
1 lab in INDIA
1 lab in IRAN, Islamic Republic of
1 lab in ISRAEL
1 lab in ITALY
1 lab in KAZAKHSTAN
1 lab in KOREA, Republic of
4 labs in NETHERLANDS
1 lab in POLAND
2 labs in PORTUGAL
1 lab in SAUDI ARABIA
1 lab in SPAIN
1 lab in UNITED KINGDOM
2 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

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