Results of Proficiency Test
mixed-Xylenes
October 2019

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: ing. R.J. Starink
Correctors: ing. A.S. Noordman-de Neef & ing. M. Meijer
Report: iis19C13

December 2019

CONTENTS

1 INTRODUCTION

Since 1995 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for mixed-Xylenes once every two years. During the annual proficiency testing program 2019/2020, it was decided to continue the round robin for the analyzes of mixed-Xylenes. In this interlaboratory study 28 laboratories in 15 different countries registered for participation. See appendix 2 for the number of participants per country. In this report, the results of the 2019 interlaboratory study on mixed-Xylenes 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 2 samples of 250 mL bottles labelled #19196 and #19197 with different composition. 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

Two different mixtures of Xylenes were prepared: sample #19196 without Ethylbenzene and sample #19197 with Ethylbenzene. Both batches were prepared from bulk material of high purity Xylenes. Approximately 15 liters of each mixture was prepared.
Subsequently, out of each batch respectively 54 and 58 amber glass bottles of 250 mL were filled and labelled respectively #19196 and #19197.
The homogeneity of the subsamples #19196 and #19197 was checked by determination of sum m- and p-Xylenes and o-Xylene accordance with test method ASTM D7504 on 8 stratified randomly selected samples.

	Sample #19196		Sample #19197	
	m+p-Xylenes in %M/M	o-Xylene in %M/M	m+p-Xylenes in %M/M	o-Xylene in %M/M
Sample 1	55.9531	42.8968	61.8498	26.1235
Sample 2	55.9588	42.8820	61.8411	26.1263
Sample 3	55.9497	42.8820	61.8372	26.1288
Sample 4	55.9532	42.8814	61.8353	26.1262
Sample 5	55.9520	42.8803	61.8370	26.1256
Sample 6	55.9549	42.8769	61.8354	26.1239
Sample 7	55.9540	42.8711	61.8414	26.1168
Sample 8	55.9500	42.8780	61.8355	26.1254

Table 1: homogeneity tests results of subsamples #19196 and #19197.

From the above test results the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibility of the reference test method in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Sample #19196		Sample #19197	
	m+p-Xylenes in %M/M	o-Xylene in %M/M	m+p-Xylenes in %M/M	o-Xylene in %M/M
r (observed)	0.0081	0.0205	0.0139	0.0099
reference test method	ASTM D7504:18	ASTM D7504:18	ASTM D7504:18	ASTM D7504:18
0.3 x R (ref. test method)	0.3588	0.6511	0.3965	0.3967

Table 2: evaluation of repeatabilities of subsamples #19196 and #19197.

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

To each of the participating laboratories one bottle of 250 mL, labelled #19196 and one bottle of 250 mL, labelled #19197 were sent on September 18, 2019. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of the materials packed in the amber glass bottles was checked. The materials were found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were asked to determine on samples #19196 and #19197: Benzene, Toluene, Ethylbenzene p-Xylene, m-Xylene, o-Xylene, iso-Propyl Benzene, sum of m- and p-Xylenes, 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 appropriate reference test methods that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

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

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

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

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

3.2 GRAPHICS

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

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

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ASTM reproducibilities, 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. In some cases, a reproducibility based on former iis proficiency tests could be used.

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples to laboratories in Brazil, P.R. of China and Israel. Two participants reported results after the final reporting date and six other laboratories did not report any test results. Not all participants were able to report all requested parameters.
Finally, 22 laboratories did report 406 numerical test results. Observed were 18 outlying test results, which is 4.4%. In proficiency studies outlier percentages of 3 - 7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER TEST

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

In the previous proficiency tests on mixed-Xylenes a variety of test methods were required to have target reproducibilities of most components: e.g. ASTM D2360 and ASTM D6563.
In 2016, a new standardized test method ASTM D7504 that covers all components evaluated in this study, was launched and it replaced ASTM D2360:11. The latter one has been withdrawn.
In ASTM D7504, for all components only reproducibilities at one defined concentration were given. In order to calculate the z-scores, estimated target reproducibilities derived from ASTM D7504 were used. Regretfully, not for all components the estimated target reproducibility derived from ASTM D7504 was used. The target reproducibility estimated from the reproducibilities mentioned in ASTM D7504:18 (table 9) are in both samples for several components unrealistically large or small (for example Benzene, Toluene, Non-aromatics). This occurs when the concentration of the sample strongly deviates from the target concentration as mentioned in table 9 of ASTM D7504:18. For these components the estimated target reproducibility based on the Horwitz equation was used.

Sample #19196

Benzene: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility using the Horwitz equation.

Toluene: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility using the Horwitz equation.

Ethylbenzene: This determination may be problematic for a number of laboratories. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility using the Horwitz equation.

p-Xylene: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated requirements of ASTM D7504:18.

m-Xylene: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated requirements of ASTM D7504:18.

o-Xylene: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the estimated requirements of ASTM D7504:18.

iso-Propyl Benzene: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated requirements of ASTM D7504:18.

sum m+p-Xylenes: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated requirements from ASTM D7504:18.

sum of $C9^+$ arom.: This determination may be problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility using the Horwitz equation (4 components).

Non-aromatics: This determination may be problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the estimated reproducibility using the Horwitz equation (9 components).

Sample #19197

Benzene: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated requirements of ASTM D7504:18.

Toluene: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated requirements of ASTM D7504:18.

Ethylbenzene: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated requirements of ASTM D7504:18.

p-Xylene: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated requirements of ASTM D7504:18.

m-Xylene: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated requirements of ASTM D7504:18.

o-Xylene: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the estimated requirements of ASTM D7504:18.

iso-Propyl Benzene: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the estimated requirements of ASTM D7504:18.

sum m+p-Xylenes: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated requirements of ASTM D7504:18.

sum of $C9^+$ arom.: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility using the Horwitz equation (4 components).

Non-aromatics: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated reproducibility using 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 relevant reference test method or as declared by the estimated target reproducibility using the Horwitz equation and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average result, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from reference test methods (in casu ASTM test methods) or the estimated target reproducibility are presented in the next tables.

Component	unit	n	average	2.8 * sd	R(lit)
Benzene	%M/M	20	0.240	0.059	0.033
Toluene	%M/M	20	0.326	0.053	0.043
Ethylbenzene	%M/M	18	0.039	0.007	0.007
p-Xylene	%M/M	20	29.03	0.29	0.47
m-Xylene	%M/M	20	27.05	0.24	0.38
o-Xylene	%M/M	21	42.81	0.30	2.17
iso-Propyl Benzene	%M/M	19	0.131	0.026	0.016
sum of m- and p-Xylenes	%M/M	21	56.08	0.37	1.20
sum of $C9^+$ aromatics	%M/M	17	0.164	0.058	0.048
Non-aromatics	%M/M	21	0.377	0.165	0.147

Table 3: reproducibilities of tests on sample #19196.

Component	unit	n	average	2.8 * sd	R(lit)
Benzene	%M/M	17	0.005	0.003	0.011
Toluene	%M/M	18	0.007	0.002	0.016
Ethylbenzene	%M/M	20	11.74	0.20	0.38
p-Xylene	%M/M	21	22.09	0.20	0.35
m-Xylene	%M/M	20	39.98	0.33	0.57
o-Xylene	%M/M	19	26.03	0.22	1.32
iso-Propyl Benzene	%M/M	20	0.080	0.016	0.010
sum of m- and p-Xylenes	%M/M	20	62.10	0.47	1.33
sum of $C9^+$ aromatics	%M/M	16	0.103	0.031	0.032
Non-aromatics	%M/M	20	0.046	0.023	0.025

Table 4: reproducibilities of tests on sample #19197.

Without further statistical calculations it could be concluded that for several components there is a good compliance of the group of participating laboratories with the relevant reference test methods. The components that are problematic have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE OCTOBER 2019 PROFICIENCY TEST WITH PREVIOUS PTS

	October 2019	October 2017	October 2015	September 2013	September 2011
Number of reporting laboratories	22	27	29	29	29
Number of test results	406	502	546	519	519
Number of statistical outliers	18	33	42	57	36
Percentage outliers	4.4%	6.6%	7.7%	11.0%	6.9%

Table 5: comparison with previous proficiency tests.

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

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

Component	October 2019 *)		October 2017 *)		October 2015		September 2013		September 2011	
Benzene	-	++	n.e.	++	n.e.	-	n.e.	(--)	--	n.e.
Toluene	-	++	++	++	+	+/-	++	--	+/-	++
Ethylbenzene	+/-	+	+/-	++	++	--	+/-	++	--	++
p-Xylene	+	+	+	++	+	++	-	++	++	++
m-Xylene	+	+	++	++	-	+	-	++	+/-	-
o-Xylene	++	++	+/-	+	+	+	--	+/-	--	+/-
iso-Propyl Benzene	-	-	+/-	--	-	-	+	--	--	+
sum of m- and p-Xylenes	++	++	++	++	+	+	n.e.	n.e.	n.e.	n.e.
sum of $C9^+$ aromatics	-	+/-	++	--	n.e.	n.e.	+	--	--	--
Non-aromatics	-	+/-	+	-	--	--	--	--	--	-

Table 6: comparison of performances against the reference test method requirements over the last PTs.

Results between brackets are outside application range of test method.

*) This year a new target test method was used (ASTM D7504 instead of ASTM D2360 and D6563)

The following performance categories were used:

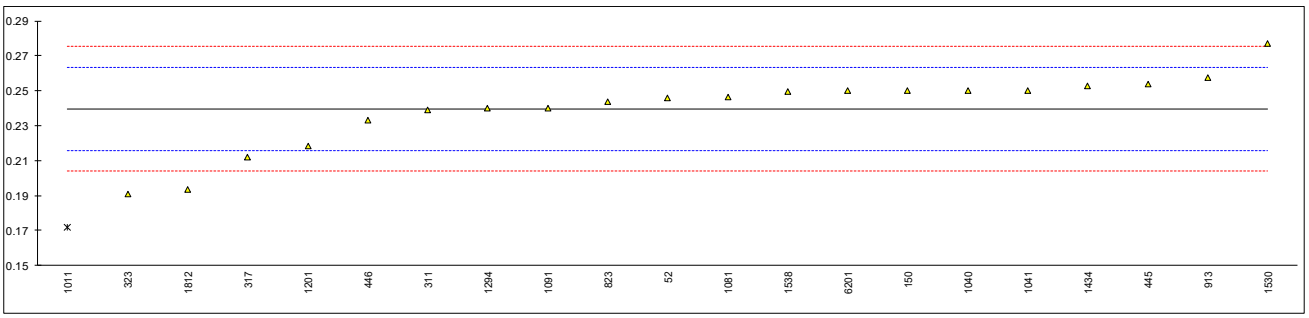
- ++: group performed much better than the reference test methods
- + : group performed better than the reference test methods
- +/-: group performance equals the reference test methods
- - : group performed worse than the reference test methods
- -- : group performed much worse than the reference test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

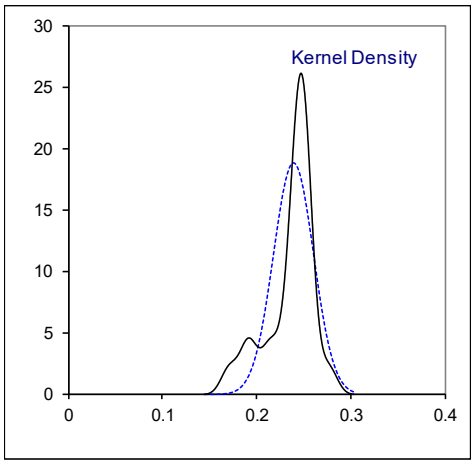
APPENDIX 1

Determination of Benzene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.2459		0.52	
150	D6563	0.25		0.87	
171		-----		-----	
311	D7504	0.239		-0.06	
317	D7504	0.2118		-2.34	
323	D7504	0.1908		-4.11	
445	D2360	0.2538		1.19	
446	D6563	0.233		-0.56	
551		-----		-----	
555		-----		-----	
823	D6563	0.2438		0.35	
862		-----		-----	
913	D7504	0.2573		1.48	
1011	D5917	0.172	R(0.05)	-5.69	
1040	D7504	0.250		0.87	
1041	D6563	0.25		0.87	
1081	D6563	0.2462		0.55	
1091	D7504	0.2402		0.04	
1201	D6563	0.2185		-1.78	
1294	D5917	0.24	C	0.03	First reported 0.396
1434	D4492	0.25275		1.10	
1530	D7504	0.277		3.14	
1538	D6563	0.2498		0.85	
1653		-----		-----	
1669		-----		-----	
1812		0.1936		-3.88	
6201	D7504	0.2499		0.86	
6262		-----		-----	

	normality	suspect	
	n	20	
	outliers	1	
	mean (n)	0.23967	
	st.dev. (n)	0.021129	
	R(calc.)	0.05916	
	st.dev.(Horwitz)	0.011886	
	R(Horwitz)	0.03328	
Compare			
	R(D7504:18)	0.55924	Table 9 of D7504:18: R = 0.0014 at 0.0006 %M/M

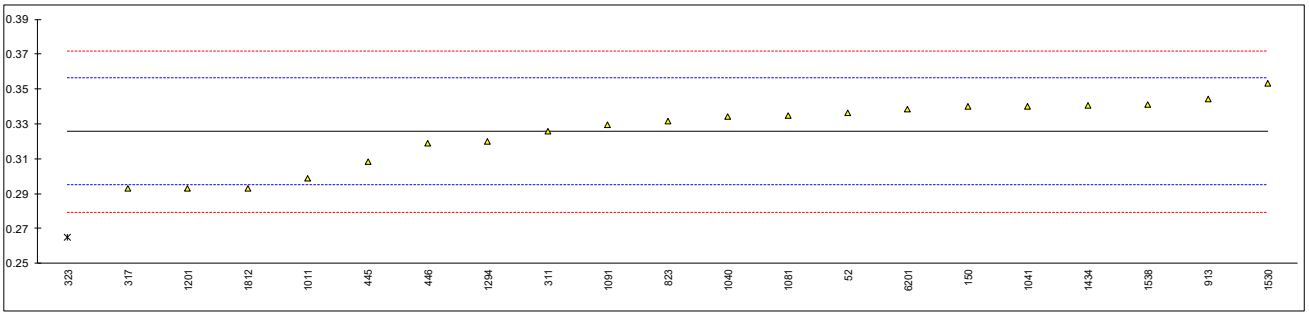


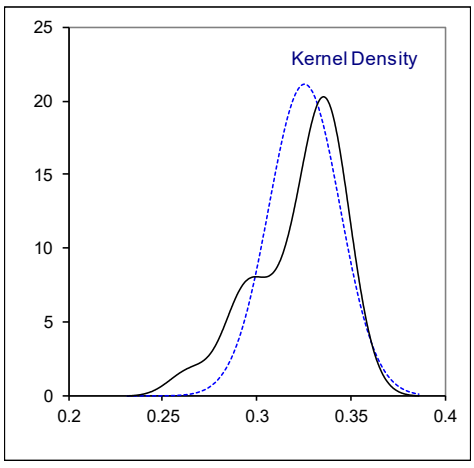


Determination of Toluene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.3361		0.67	
150	D6563	0.34		0.93	
171		-----		-----	
311	D7504	0.326		0.02	
317	D7504	0.2927		-2.14	
323	D7504	0.2650	G(0.05)	-3.94	
445	D2360	0.3085		-1.11	
446	D6563	0.319		-0.43	
551		-----		-----	
555		-----		-----	
823	D6563	0.3316		0.38	
862		-----		-----	
913	D7504	0.3443		1.21	
1011	D5917	0.299		-1.73	
1040	D7504	0.334		0.54	
1041	D6563	0.34		0.93	
1081	D6563	0.3349		0.60	
1091	D7504	0.3295		0.25	
1201	D6563	0.2927		-2.14	
1294	D5917	0.32	C	-0.37	First reported 0.366
1434	D4492	0.34054		0.96	
1530	D7504	0.353		1.77	
1538	D6563	0.3410		0.99	
1653		-----		-----	
1669		-----		-----	
1812		0.2927		-2.14	
6201	D7504	0.3384		0.82	
6262		-----		-----	

	normality	OK	
	n	20	
	outliers	1	
	mean (n)	0.32570	
	st.dev. (n)	0.018890	
	R(calc.)	0.05289	
	st.dev.(Horwitz)	0.015424	
	R(Horwitz)	0.04319	
Compare			
	R(D7504:18)	0.76850	Table 9 of D7504:18: R = 0.0315 at 0.01335 %M/M

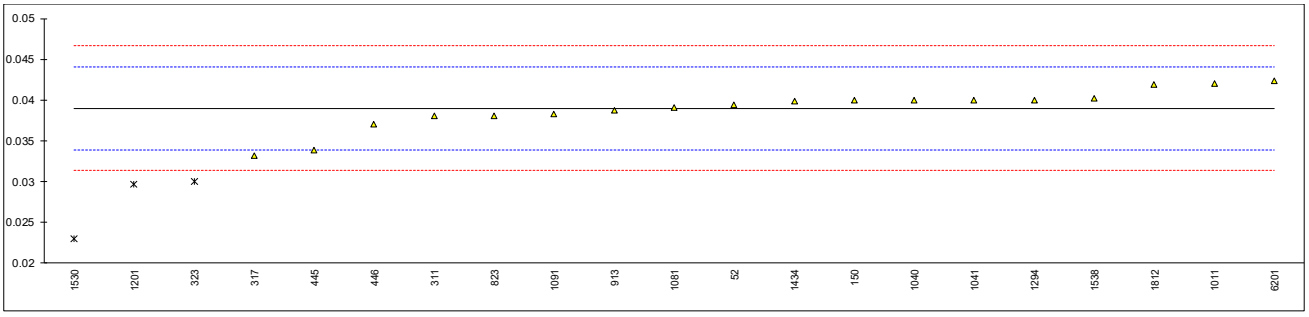


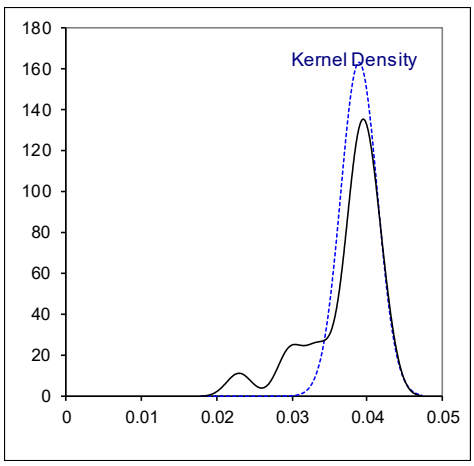


Determination of Ethylbenzene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0394		0.16	
150	D6563	0.04		0.40	
171		-----		-----	
311	D7504	0.038		-0.39	
317	D7504	0.0332		-2.28	
323	D6563	0.03	R(0.05)	-3.54	
445	D6563	0.0338		-2.04	
446	D6563	0.037		-0.78	
551		-----		-----	
555		-----		-----	
823	D6563	0.0380		-0.39	
862		-----		-----	
913	D7504	0.0387		-0.11	
1011	D5917	0.042		1.19	
1040	D7504	0.040		0.40	
1041	D6563	0.04		0.40	
1081	D6563	0.0391		0.04	
1091	D7504	0.0383		-0.27	
1201	D6563	0.0296	R(0.05)	-3.69	
1294	D5917	0.04	C	0.40	First reported 0.033
1434	D4492	0.03988		0.35	
1530	D7504	0.023	R(0.05)	-6.29	
1538	D7504	0.0402		0.48	
1653		-----		-----	
1669		-----		-----	
1812	D7504	0.0419		1.15	
6201	D7504	0.0423		1.30	
6262		-----		-----	

	normality	suspect	
	n	18	
	outliers	3	
	mean (n)	0.03899	
	st.dev. (n)	0.002449	
	R(calc.)	0.00686	
	st.dev.(Horwitz)	0.002541	
	R(Horwitz)	0.00712	
Compare			
	R(D7504:18)	0.00128	Table 9 of D7504:18: R = 0.2089 at 6.3705 %M/M
	R(D6563:12)	0.00033	Table 7 of D6563:12: R = 0.153 at 17.92 %M/M

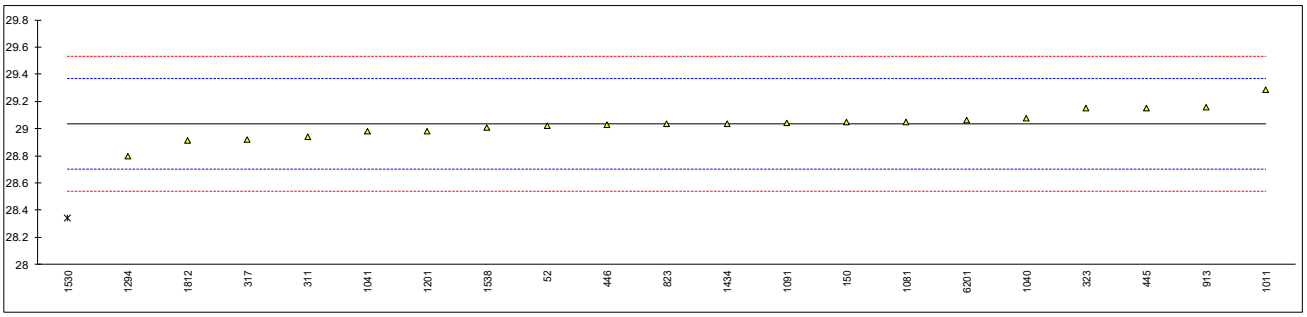


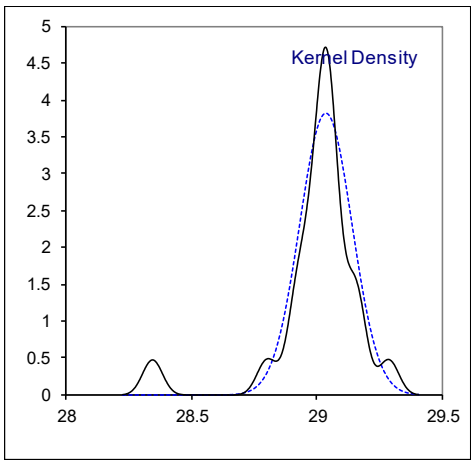


Determination of p-Xylene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	29.0193		-0.09	
150	D6563	29.05		0.09	
171		-----		-----	
311	D7504	28.94		-0.57	
317	D7504	28.92		-0.69	
323	D6563	29.15		0.69	
445	D6563	29.1529		0.71	
446	D6563	29.031		-0.02	
551		-----		-----	
555		-----		-----	
823	D6563	29.0321		-0.02	
862		-----		-----	
913	D7504	29.16		0.75	
1011	D5917	29.286		1.51	
1040	D7504	29.076		0.25	
1041	D6563	28.98		-0.33	
1081	D6563	29.0516		0.10	
1091	D7504	29.0414		0.04	
1201	D6563	28.9839		-0.31	
1294	D5917	28.8	C	-1.41	First reported 41.67
1434	D4492	29.0322		-0.01	
1530	D7504	28.342	R(0.01)	-4.17	
1538	D7504	29.0107		-0.14	
1653		-----		-----	
1669		-----		-----	
1812	D7504	28.913		-0.73	
6201	D7504	29.0625		0.17	
6262		-----		-----	

	normality	suspect
	n	20
	outliers	1
	mean (n)	29.0346
	st.dev. (n)	0.10453
	R(calc.)	0.2927
	st.dev.(D7504:18)	0.16622
	R(D7504:18)	0.4654
Compare		
	R(D6563:12)	0.2780

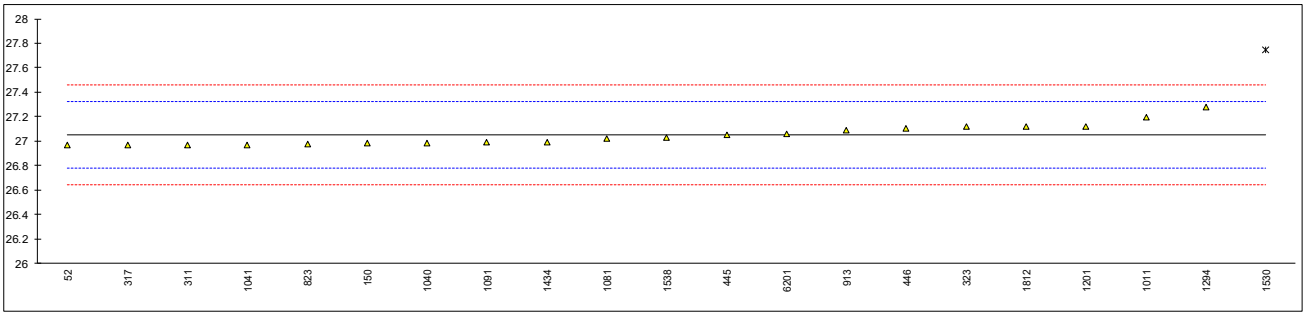


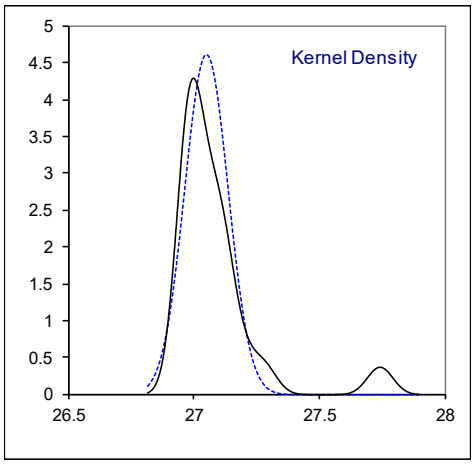


Determination of m-Xylene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	26.9689		-0.59	
150	D6563	26.98		-0.51	
171		-----		-----	
311	D7504	26.97		-0.59	
317	D7504	26.97		-0.59	
323	D6563	27.12		0.51	
445	D6563	27.0515		0.01	
446	D6563	27.107		0.42	
551		-----		-----	
555		-----		-----	
823	D6563	26.9798		-0.51	
862		-----		-----	
913	D7504	27.09		0.29	
1011	D5917	27.195		1.06	
1040	D7504	26.984		-0.48	
1041	D6563	26.97		-0.59	
1081	D6563	27.0181		-0.23	
1091	D7504	26.9915		-0.43	
1201	D6563	27.1230		0.53	
1294	D5917	27.28	C	1.68	First reported 13.579
1434	D4492	26.99186		-0.43	
1530	D7504	27.744	R(0.01)	5.08	
1538	D7504	27.0311		-0.14	
1653		-----		-----	
1669		-----		-----	
1812	D7504	27.1206		0.52	
6201	D7504	27.0578		0.06	
6262		-----		-----	

	normality	not OK
	n	20
	outliers	1
	mean (n)	27.0500
	st.dev. (n)	0.08651
	R(calc.)	0.2422
	st.dev.(D7504:18)	0.13659
	R(D7504:18)	0.3824
Compare		
	R(D6563:12)	0.2264

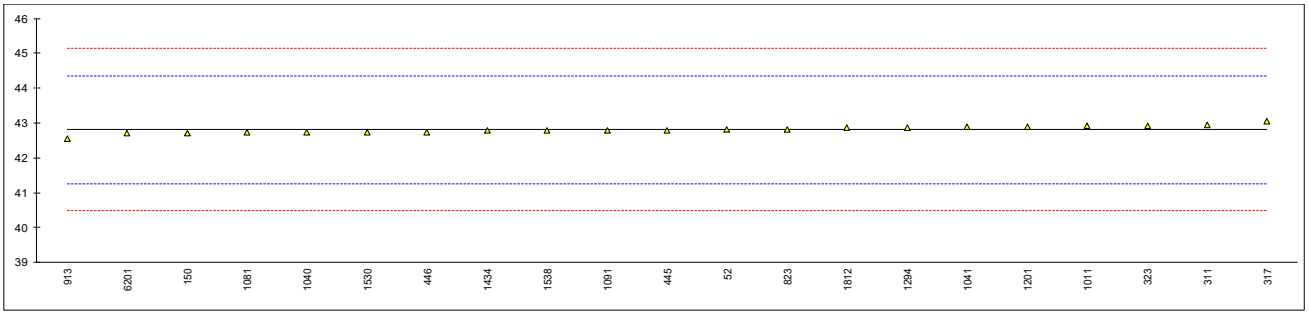


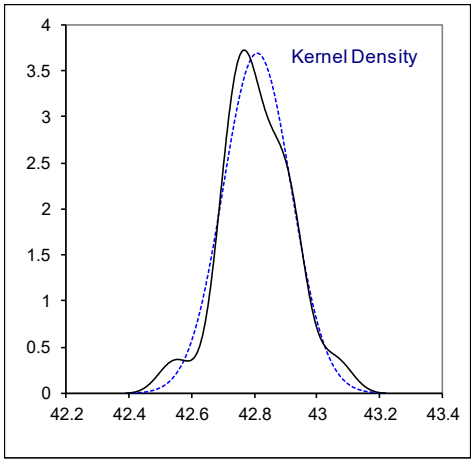


Determination of o-Xylene on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	Remarks
52	D7504	42.8031		-0.01	
150	D6563	42.72		-0.12	
171		-----		-----	
311	D7504	42.94		0.17	
317	D7504	43.06		0.32	
323	D6563	42.92		0.14	
445	D6563	42.7947		-0.02	
446	D6563	42.743		-0.09	
551		-----		-----	
555		-----		-----	
823	D6563	42.8075		0.00	
862		-----		-----	
913	D7504	42.55		-0.34	
1011	D5917	42.912		0.13	
1040	D7504	42.727		-0.11	
1041	D6563	42.89		0.10	
1081	D6563	42.7224		-0.11	
1091	D7504	42.7853		-0.03	
1201	D6563	42.8982		0.11	
1294	D5917	42.87	C	0.08	First reported 0.202
1434	D4492	42.77401		-0.05	
1530	D7504	42.741		-0.09	
1538	D5134	42.7792		-0.04	
1653		-----		-----	
1669		-----		-----	
1812	D7504	42.858		0.06	
6201	D7504	42.7128		-0.13	
6262		-----		-----	

	normality	suspect
	n	21
	outliers	0
	mean (n)	42.8099
	st.dev. (n)	0.10819
	R(calc.)	0.3029
	st.dev.(D7504:18)	0.77382
	R(D7504:18)	2.1667
Compare		
	R(D6563:12)	0.4634

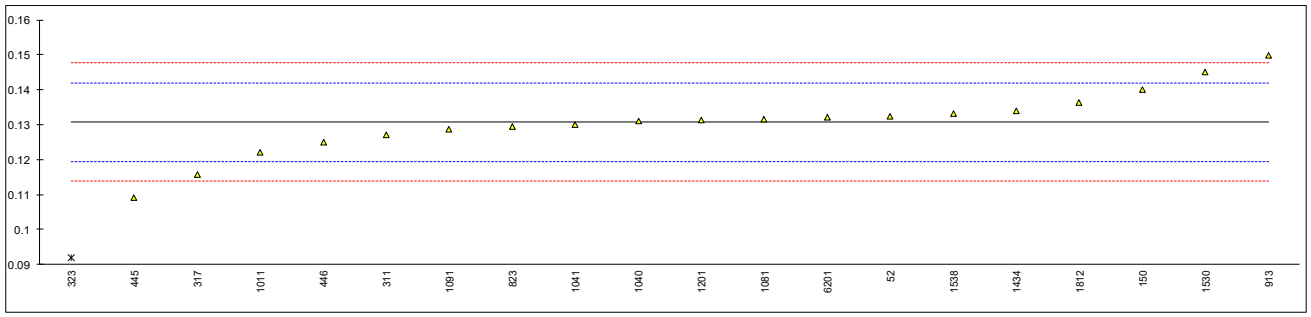


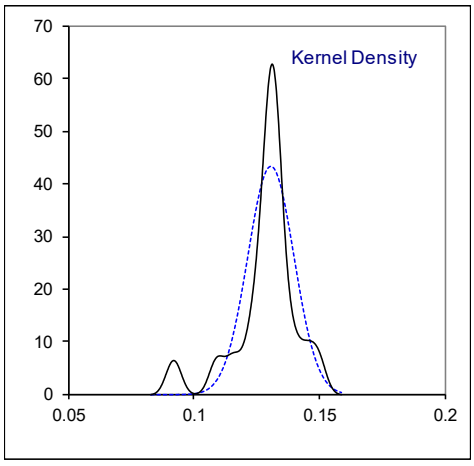


Determination of iso-Propyl Benzene (Cumene) on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.1324		0.30	
150	D6563	0.14		1.65	
171		-----		-----	
311	D7504	0.127		-0.66	
317	D7504	0.1157		-2.66	
323	D7504	0.0919	R(0.05)	-6.89	
445	D2360	0.1091	C	-3.83	First reported 0.0277
446	D6563	0.125		-1.01	
551		-----		-----	
555		-----		-----	
823	D6563	0.1294		-0.23	
862		-----		-----	
913	D7504	0.1497		3.37	
1011	D5917	0.122		-1.54	
1040	D7504	0.131		0.05	
1041	D6563	0.13		-0.12	
1081	D6563	0.1315		0.14	
1091	D7504	0.1286		-0.37	
1201	D6563	0.1312		0.09	
1294		-----		-----	
1434	D4492	0.134		0.59	
1530	D7504	0.145		2.54	
1538	D7504	0.1331		0.43	
1653		-----		-----	
1669		-----		-----	
1812	D7504	0.1363		0.99	
6201	D7504	0.1322		0.27	
6262		-----		-----	

	normality	suspect
	n	19
	outliers	1
	mean (n)	0.13069
	st.dev. (n)	0.009208
	R(calc.)	0.02578
	st.dev.(D7504:18)	0.005635
	R(D7504:18)	0.01578
Compare		
	R(Horwitz)	0.01988

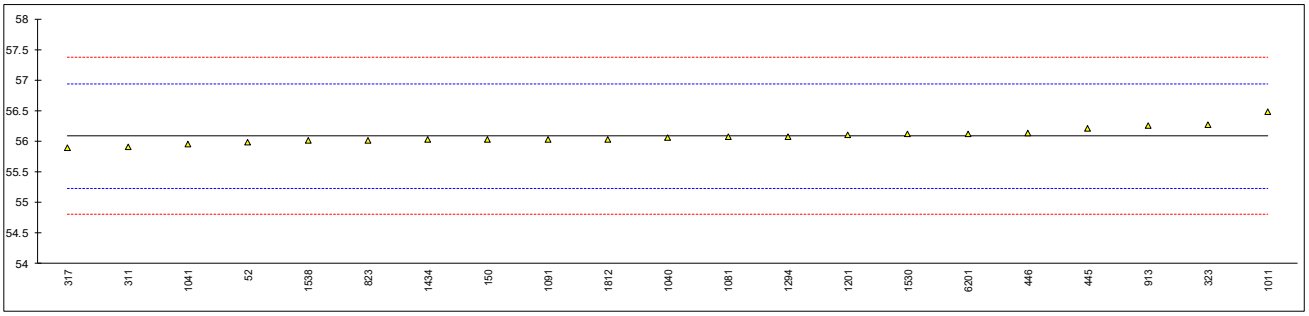


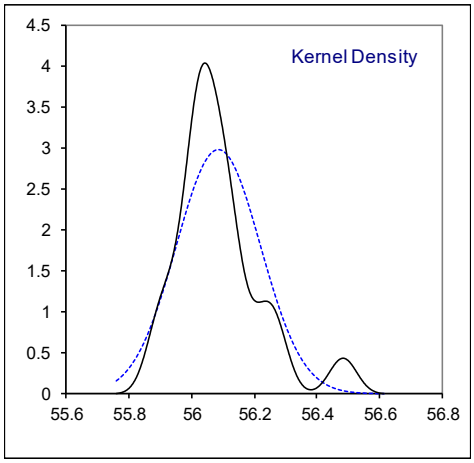


Determination of sum of m- and p-Xylenes on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	55.9882		-0.22	
150	D6563	56.03		-0.13	
171		-----		-----	
311	D7504	55.91		-0.41	
317	D7504	55.89		-0.45	
323	D6563	56.27		0.43	
445	D6563	56.2044		0.28	
446	D6563	56.138		0.13	
551		-----		-----	
555		-----		-----	
823	D6563	56.0119		-0.17	
862		-----		-----	
913	D7504	56.25		0.39	
1011	D5917	56.481		0.93	
1040	D7504	56.060		-0.06	
1041	D6563	55.95		-0.31	
1081	D6563	56.0697		-0.03	
1091	D7504	56.0329		-0.12	
1201	D6563	56.1069		0.05	
1294	D5917	56.08	C	-0.01	First reported 55.249
1434	D4492	56.02406		-0.14	
1530	D7504	56.113		0.07	
1538	D5134	56.0085		-0.18	
1653		-----		-----	
1669		-----		-----	
1812	D7504	56.0336		-0.12	
6201	D7504	56.1203		0.08	
6262		-----		-----	

	normality	not OK
	n	21
	outliers	0
	mean (n)	56.0844
	st.dev. (n)	0.13384
	R(calc.)	0.3747
	st.dev.(D7504:18)	0.42812
	R(D7504:18)	1.1987
Compare		
	R(D6563:12)	0.7132

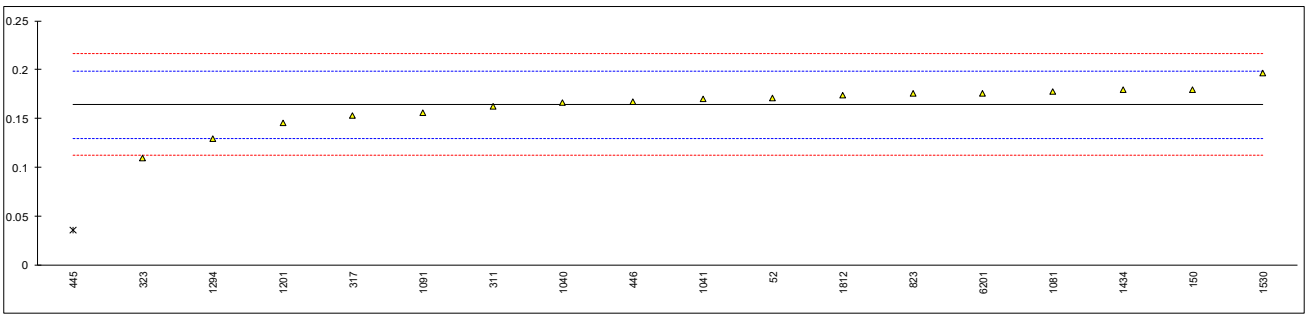


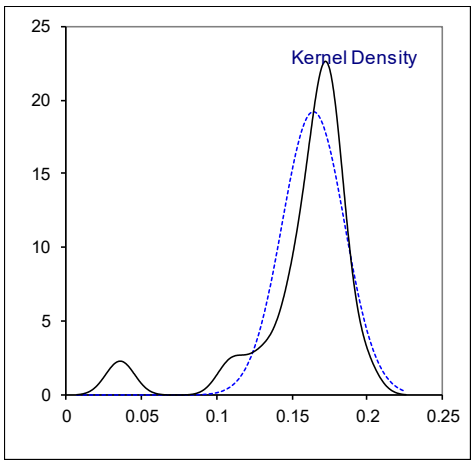


Determination of sum of C9 and heavier aromatics on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.1714		0.41	
150	D6563	0.18		0.91	
171		-----		-----	
311	D7504	0.163		-0.07	
317	D7504	0.1528		-0.67	
323	D6563	0.11		-3.15	
445	D6563	0.0359	G(0.01)	-7.44	
446	D6563	0.167		0.16	
551		-----		-----	
555		-----		-----	
823	D6563	0.1760		0.68	
862		-----		-----	
913		-----		-----	
1011		-----		-----	
1040	D7504	0.166		0.10	
1041	D6563	0.17		0.33	
1081	D6563	0.1778		0.78	
1091	D7504	0.1558		-0.49	
1201	D6563	0.1459		-1.07	
1294	D5917	0.13	C	-1.99	First reported 43.741
1434	D4492	0.17949		0.88	
1530	D7504	0.197		1.90	
1538		-----		-----	
1653		-----		-----	
1669		-----		-----	
1812	D7504	0.1744		0.59	
6201	D7504	0.1762		0.69	
6262		-----		-----	

	normality	not OK	
	n	17	
	outliers	1	
	mean (n)	0.16428	
	st.dev. (n)	0.020725	
	R(calc.)	0.05803	
	st.dev.(Horwitz)	0.017248	
	R(Horwitz)	0.04830	4 components
Compare			
	R(D7504:18)	0.09285	Table 9 of D7504:18: R = 0.0013 at 0.0023 %M/M

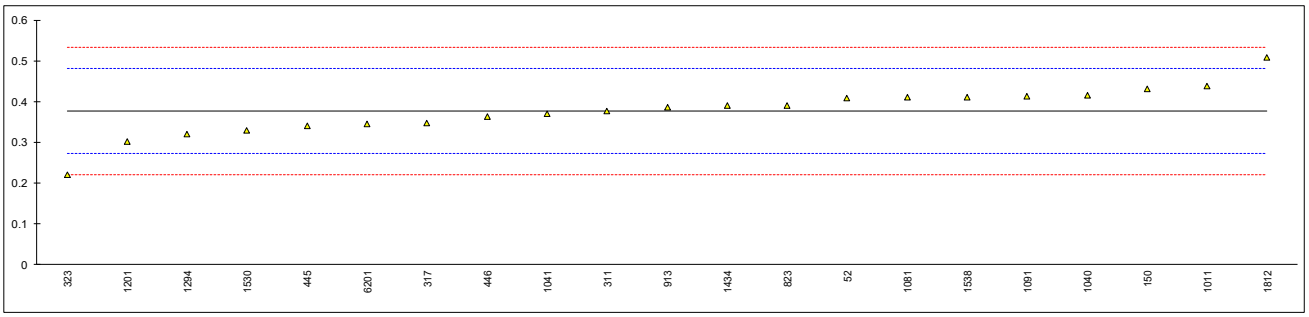


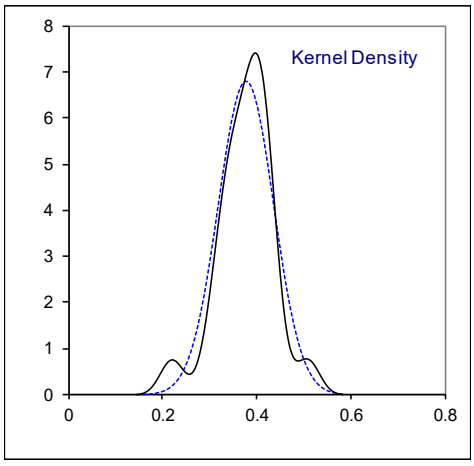


Determination of Non-aromatics on sample #19196; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.4085		0.60	
150	D6563	0.43		1.01	
171		-----		-----	
311	D7504	0.377		0.00	
317	D7504	0.3466		-0.58	
323	D6563	0.22		-2.99	
445	D2360	0.3405		-0.69	
446	D6563	0.363		-0.26	
551		-----		-----	
555		-----		-----	
823	D6563	0.3912		0.27	
862		-----		-----	
913	D7504	0.3853		0.16	
1011	D5917	0.437		1.15	
1040	D7504	0.416		0.75	
1041	D6563	0.37		-0.13	
1081	D6563	0.4099		0.63	
1091	D7504	0.4125		0.68	
1201	D6563	0.3024		-1.42	
1294	D5917	0.32	C	-1.09	First reported 0.013
1434	D4492	0.38927		0.24	
1530	D7504	0.330		-0.89	
1538	D2360	0.4112		0.66	
1653		-----		-----	
1669		-----		-----	
1812	D7504	0.508	C	2.50	First reported 0.586
6201	D7504	0.3460		-0.59	
6262		-----		-----	

	normality	not OK	
	n	21	
	outliers	0	
	mean (n)	0.37687	
	st.dev. (n)	0.058801	
	R(calc.)	0.16464	
	st.dev.(Horwitz)	0.052380	
	R(Horwitz)	0.14666	9 components
Compare			
	R(D7504:18)	0.04383	Table 9 of D7504:18: R = 0.0219 at 0.1883 %M/M

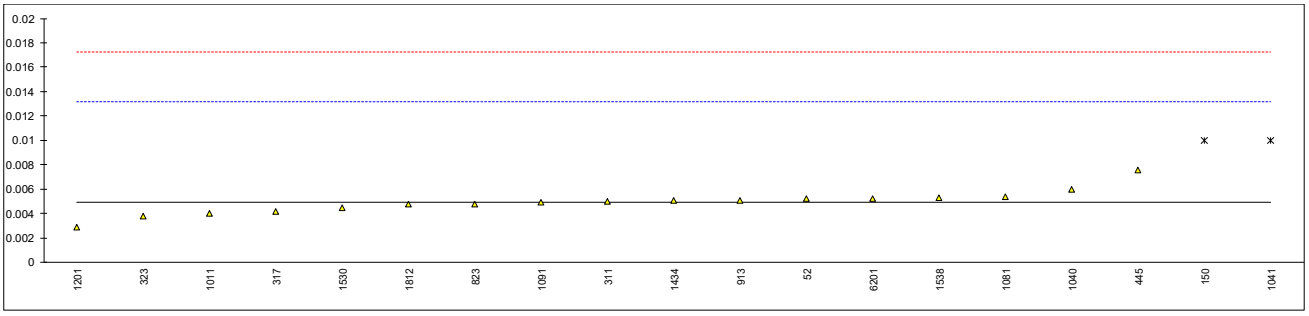


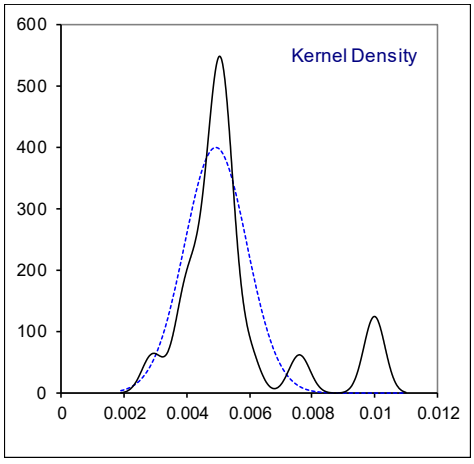


Determination of Benzene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0052		0.07	
150	D6563	0.01	DG(0.01)	1.24	
171		-----		-----	
311	D7504	0.005		0.02	
317	D7504	0.0042		-0.18	
323	D7504	0.0038		-0.27	
445	D2360	0.0076		0.65	
446	D6563	<0.01		-----	
551		-----		-----	
555		-----		-----	
823	D6563	0.0048		-0.03	
862		-----		-----	
913	D7504	0.0051		0.04	
1011	D5917	0.004		-0.23	
1040	D7504	0.006		0.26	
1041	D6563	0.01	DG(0.01)	1.24	
1081	D6563	0.0054035		0.12	
1091	D7504	0.0049		-0.01	
1201	D6563	0.0029		-0.49	
1294		-----		-----	
1434	D4492	0.00508		0.04	
1530	D7504	0.0045		-0.10	
1538	D7504	0.0053		0.09	
1653		-----		-----	
1669	D7504	<0.01		-----	
1812		0.004745		-0.04	
6201	D7504	0.0052		0.07	
6262		-----		-----	

	normality	not OK
	n	17
	outliers	2
	mean (n)	0.00493
	st.dev. (n)	0.000996
	R(calc.)	0.00279
	st.dev.(D7504:18)	0.004104
	R(D7504:18)	0.01149
Compare		
	R(Horwitz)	0.00123

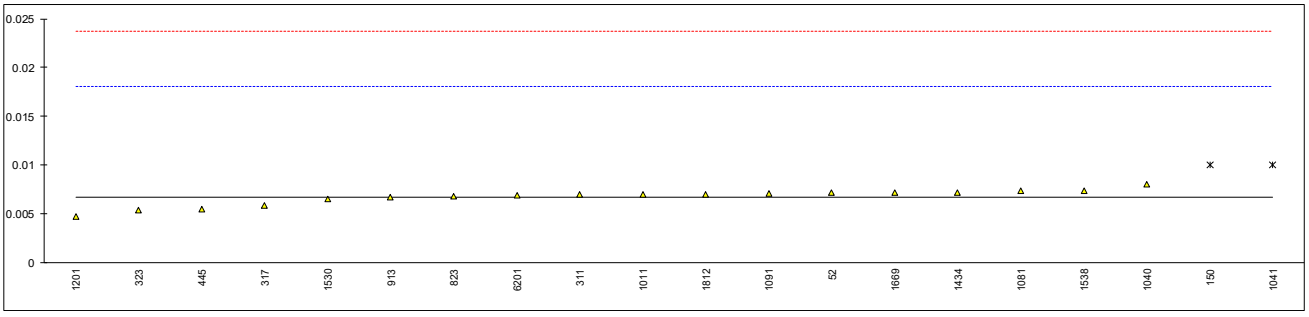


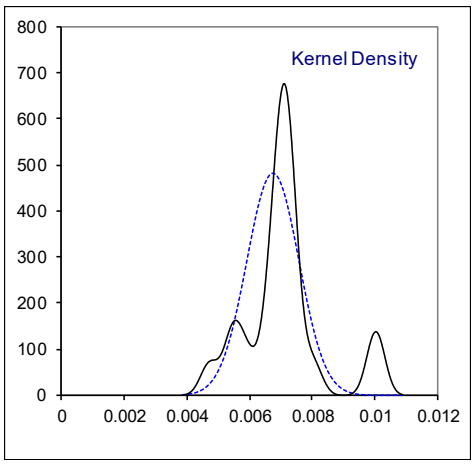


Determination of Toluene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0072		0.08	
150	D6563	0.01	DG(0.05)	0.58	
171		-----		-----	
311	D7504	0.007		0.05	
317	D7504	0.0059		-0.14	
323	D7504	0.0054		-0.23	
445	D2360	0.0055		-0.22	
446	D6563	<0.01		-----	
551		-----		-----	
555		-----		-----	
823	D6563	0.0068		0.01	
862		-----		-----	
913	D7504	0.0067		0.00	
1011	D5917	0.007		0.05	
1040	D7504	0.008		0.23	
1041	D6563	0.01	DG(0.05)	0.58	
1081	D6563	0.0073652		0.11	
1091	D7504	0.0071		0.07	
1201	D6563	0.0047		-0.36	
1294		-----		-----	
1434	D4492	0.00723		0.09	
1530	D7504	0.0065		-0.04	
1538	D2360	0.0074		0.12	
1653		-----		-----	
1669	D7504	0.0072		0.08	
1812		0.00705		0.06	
6201	D7504	0.0069		0.03	
6262		-----		-----	

	normality	OK
	n	18
	outliers	2
	mean (n)	0.00672
	st.dev. (n)	0.000830
	R(calc.)	0.00232
	st.dev.(D7504:18)	0.005662
	R(D7504:18)	0.01585
Compare		
	R(Horwitz)	0.00160

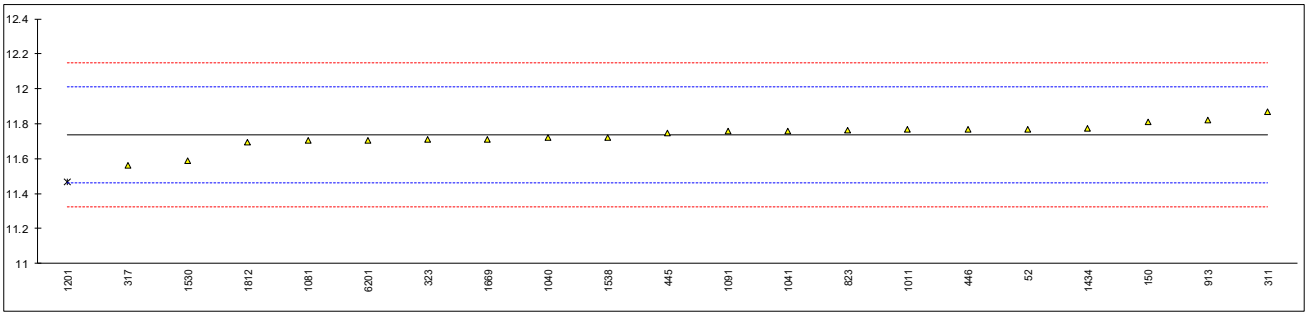


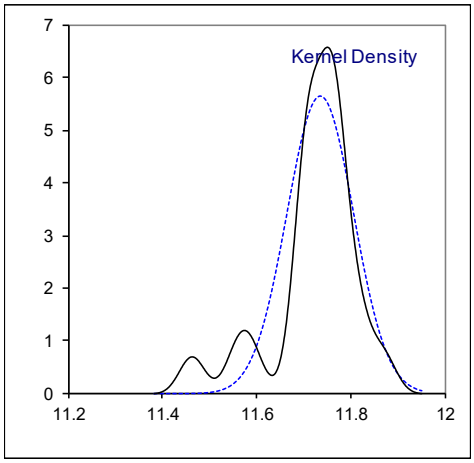


Determination of Ethylbenzene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	11.7701		0.25	
150	D6563	11.81		0.54	
171		-----		-----	
311	D7504	11.87		0.98	
317	D7504	11.56		-1.28	
323	D6563	11.71		-0.19	
445	D6563	11.7471		0.08	
446	D6563	11.769		0.24	
551		-----		-----	
555		-----		-----	
823	D6563	11.7610		0.18	
862		-----		-----	
913	D7504	11.82		0.61	
1011	D5917	11.768		0.23	
1040	D7504	11.718		-0.13	
1041	D6563	11.76		0.18	
1081	D6563	11.7053691		-0.22	
1091	D7504	11.7550		0.14	
1201	D6563	11.4641	R(0.05)	-1.98	
1294		-----		-----	
1434	D4492	11.77295		0.27	
1530	D7504	11.590		-1.06	
1538	D5134	11.7217		-0.10	
1653		-----		-----	
1669	D7504	11.7103		-0.19	
1812	D7504	11.6915		-0.32	
6201	D7504	11.7059		-0.22	
6262		-----		-----	

	normality	suspect
	n	20
	outliers	1
	mean (n)	11.7358
	st.dev. (n)	0.07063
	R(calc.)	0.1978
	st.dev.(D7504:18)	0.13744
	R(D7504:18)	0.3848
Compare		
	R(D6563:12)	0.1001

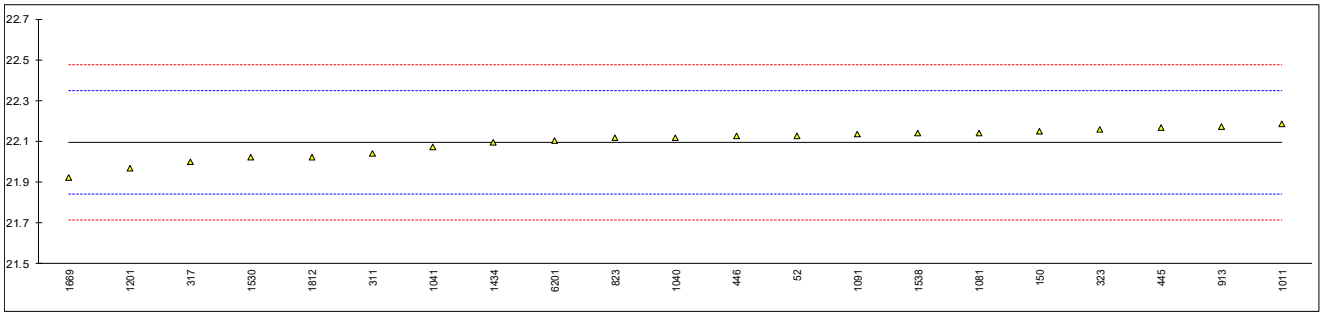


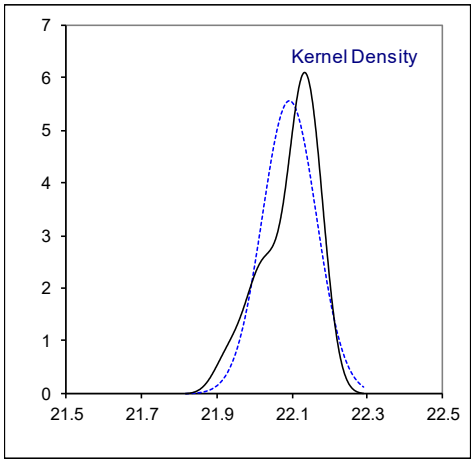


Determination of p-Xylene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	Remarks
52	D7504	22.1266		0.25	
150	D6563	22.15		0.44	
171		-----		-----	
311	D7504	22.04		-0.43	
317	D7504	22.00		-0.75	
323	D6563	22.16		0.52	
445	D6563	22.1678		0.58	
446	D6563	22.126		0.25	
551		-----		-----	
555		-----		-----	
823	D6563	22.1153		0.17	
862		-----		-----	
913	D7504	22.17		0.60	
1011	D5917	22.186		0.72	
1040	D7504	22.117		0.18	
1041	D6563	22.07		-0.19	
1081	D6563	22.1420606		0.38	
1091	D7504	22.1349		0.32	
1201	D6563	21.9694		-0.99	
1294		-----		-----	
1434	D4492	22.09442		0.00	
1530	D7504	22.021		-0.58	
1538	D6563	22.1412		0.37	
1653		-----		-----	
1669	D7504	21.9239		-1.35	
1812	D7504	22.0244		-0.55	
6201	D7504	22.1020		0.06	
6262		-----		-----	

	normality	OK
	n	21
	outliers	0
	mean (n)	22.0944
	st.dev. (n)	0.07193
	R(calc.)	0.2014
	st.dev.(D7504:18)	0.12648
	R(D7504:18)	0.3542
Compare		
	R(D6563:12)	0.2115

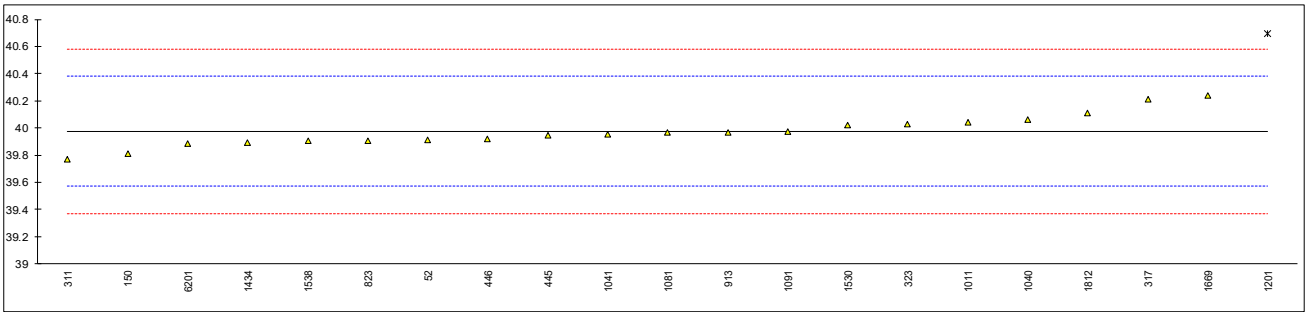


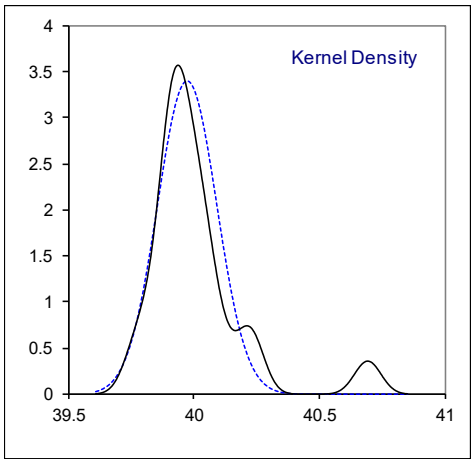


Determination of m-Xylene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	39.9139		-0.31	
150	D6563	39.81		-0.82	
171		-----		-----	
311	D7504	39.77		-1.02	
317	D7504	40.21		1.16	
323	D6563	40.03		0.27	
445	D6563	39.9467		-0.14	
446	D6563	39.919		-0.28	
551		-----		-----	
555		-----		-----	
823	D6563	39.9056		-0.35	
862		-----		-----	
913	D7504	39.97		-0.03	
1011	D5917	40.039		0.31	
1040	D7504	40.059		0.41	
1041	D6563	39.95		-0.13	
1081	D6563	39.9667121		-0.04	
1091	D7504	39.9759		0.00	
1201	D6563	40.6938	R(0.01)	3.56	
1294		-----		-----	
1434	D4492	39.88952		-0.43	
1530	D7504	40.022		0.23	
1538	D7504	39.9032		-0.36	
1653		-----		-----	
1669	D7504	40.2377		1.30	
1812	D7504	40.1099		0.67	
6201	D7504	39.8823		-0.46	
6262		-----		-----	

	normality	OK
	n	20
	outliers	1
	mean (n)	39.9755
	st.dev. (n)	0.11750
	R(calc.)	0.3290
	st.dev.(D7504:18)	0.20186
	R(D7504:18)	0.5652
Compare		
	R(D6563:12)	0.3346

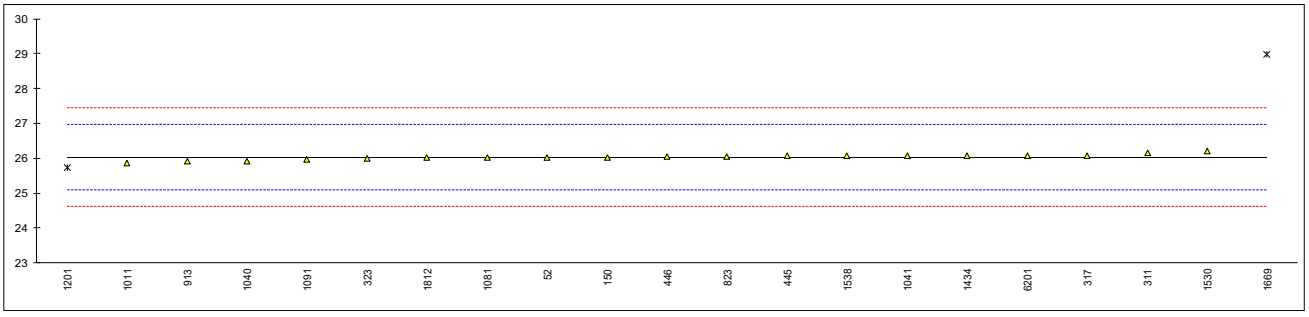


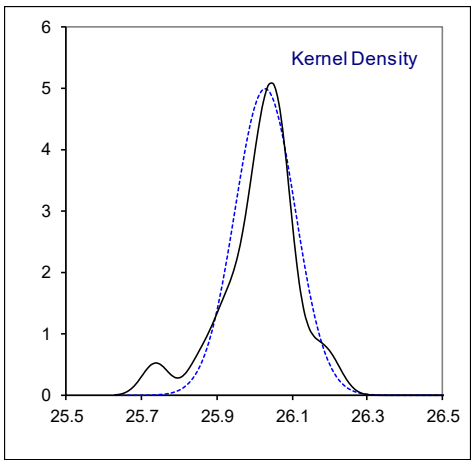


Determination of o-Xylene on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	26.0100		-0.04	
150	D6563	26.03		0.00	
171		-----		-----	
311	D7504	26.15		0.25	
317	D7504	26.08		0.11	
323	D6563	25.99		-0.09	
445	D6563	26.0600		0.06	
446	D6563	26.034		0.01	
551		-----		-----	
555		-----		-----	
823	D6563	26.0481		0.04	
862		-----		-----	
913	D7504	25.92		-0.23	
1011	D5917	25.858		-0.37	
1040	D7504	25.924		-0.23	
1041	D6563	26.07		0.08	
1081	D6563	26.0092811		-0.04	
1091	D7504	25.9625		-0.14	
1201	D6563	25.7397	R(0.05)	-0.62	
1294		-----		-----	
1434	D4492	26.07473		0.09	
1530	D7504	26.201		0.36	
1538	D5134	26.0658		0.08	
1653		-----		-----	
1669	D7504	28.9916	R(0.01)	6.29	
1812	D7504	26.0087		-0.05	
6201	D7504	26.0765		0.10	
6262		-----		-----	

	normality	OK
	n	19
	outliers	2
	mean (n)	26.0301
	st.dev. (n)	0.07986
	R(calc.)	0.2236
	st.dev.(D7504:18)	0.47051
	R(D7504:18)	1.3174
Compare		
	R(D6563:12)	0.2818

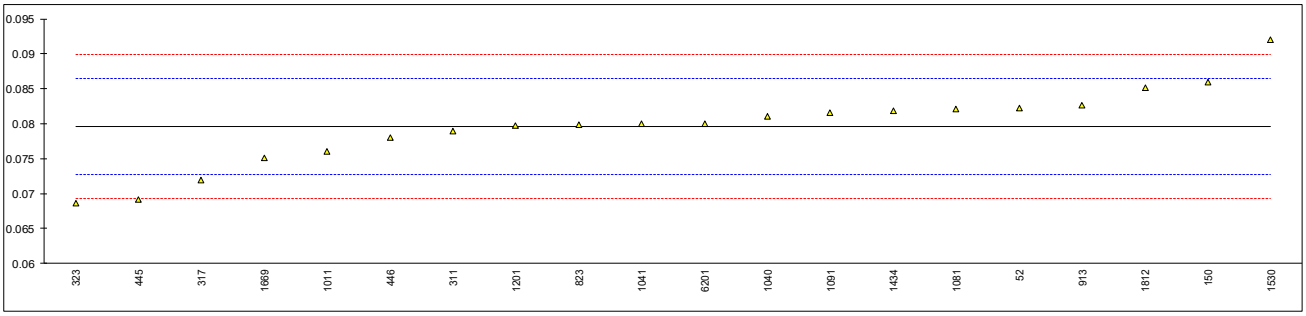


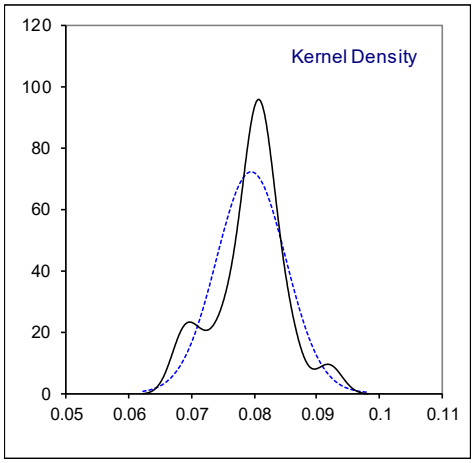


Determination of iso-Propyl Benzene (Cumene) on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0822		0.76	
150	D6563	0.086	C	1.86	First reported 0.09
171		-----		-----	
311	D7504	0.079		-0.17	
317	D7504	0.0719		-2.24	
323	D7504	0.0686		-3.21	
445	D2360	0.0692	C	-3.03	First reported 0.0257
446	D6563	0.078		-0.47	
551		-----		-----	
555		-----		-----	
823	D6563	0.0799		0.09	
862		-----		-----	
913	D7504	0.0827		0.90	
1011	D5917	0.076		-1.05	
1040	D7504	0.081		0.41	
1041	D6563	0.08		0.12	
1081	D6563	0.0821495		0.74	
1091	D7504	0.0816		0.58	
1201	D6563	0.0797		0.03	
1294		-----		-----	
1434	D4492	0.08186		0.66	
1530	D7504	0.092		3.61	
1538		-----		-----	
1653		-----		-----	
1669	D7504	0.0751		-1.31	
1812	D7504	0.0851		1.60	
6201	D7504	0.0800		0.12	
6262		-----		-----	

	normality	OK
	n	20
	outliers	0
	mean (n)	0.07960
	st.dev. (n)	0.005544
	R(calc.)	0.01552
	st.dev.(D7504:18)	0.003432
	R(D7504:18)	0.00961
Compare		
	R(Horwitz)	0.01305

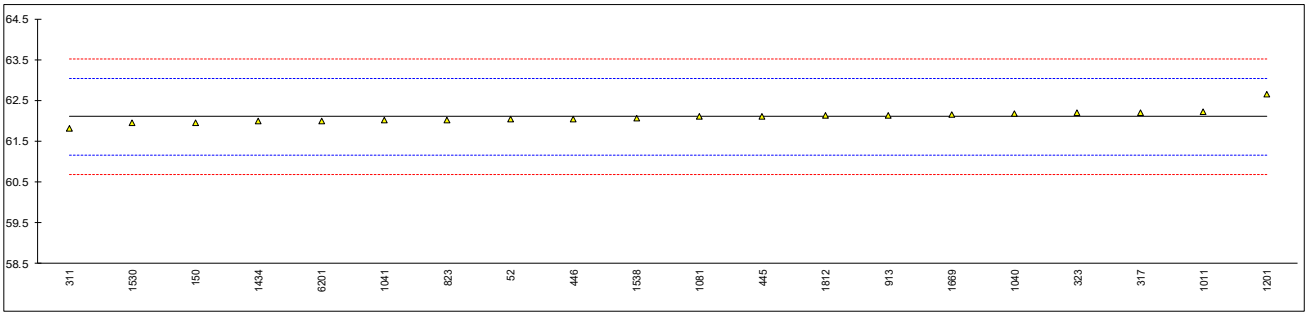


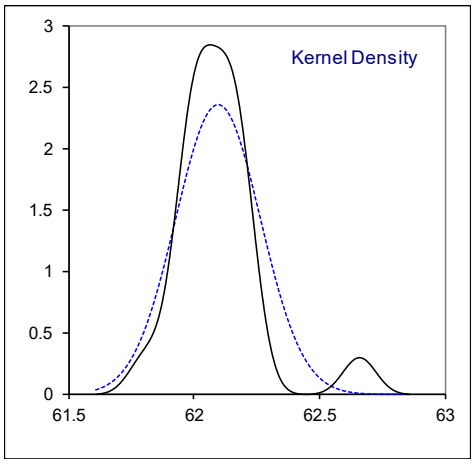


Determination of sum of m- and p-Xylenes on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	62.0405		-0.12	
150	D6563	61.96		-0.29	
171		-----		-----	
311	D7504	61.81		-0.61	
317	D7504	62.21		0.23	
323	D6563	62.19		0.19	
445	D6563	62.1146		0.03	
446	D6563	62.045		-0.11	
551		-----		-----	
555		-----		-----	
823	D6563	62.0209		-0.17	
862		-----		-----	
913	D7504	62.14		0.09	
1011	D5917	62.225		0.27	
1040	D7504	62.176		0.16	
1041	D6563	62.02		-0.17	
1081	D6563	62.1087727		0.02	
1091		-----		-----	
1201	D6563	62.6632		1.19	
1294		-----		-----	
1434	D4492	61.98394		-0.24	
1530	D7504	61.943		-0.33	
1538	D5134	62.0537		-0.10	
1653		-----		-----	
1669	D7504	62.1616		0.13	
1812	D7504	62.1343		0.07	
6201	D7504	61.9843		-0.24	
6262		-----		-----	

	normality	not OK
	n	20
	outliers	0
	mean (n)	62.0992
	st.dev. (n)	0.16893
	R(calc.)	0.4730
	st.dev.(D7504:18)	0.47403
	R(D7504:18)	1.3273
Compare		
	R(D6563:12)	0.7896

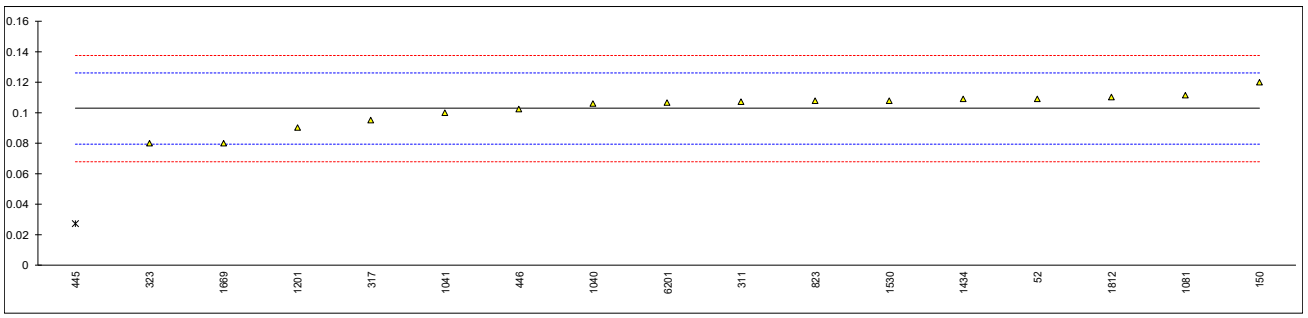


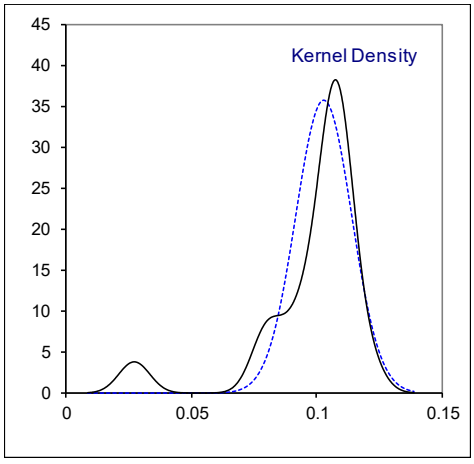


Determination of sum of C9 and heavier aromatics on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.1088		0.53	
150	D6563	0.12		1.50	
171		-----		-----	
311	D7504	0.107		0.38	
317	D7504	0.0949		-0.67	
323	D6563	0.08		-1.96	
445	D6563	0.0272	G(0.01)	-6.52	
446	D6563	0.102		-0.05	
551		-----		-----	
555		-----		-----	
823	D6563	0.1075		0.42	
862		-----		-----	
913		-----		-----	
1011		-----		-----	
1040	D7504	0.106		0.29	
1041	D6563	0.10		-0.23	
1081	D6563	0.11157184		0.77	
1091		-----		-----	
1201	D6563	0.0903		-1.07	
1294		-----		-----	
1434	D4492	0.10879		0.53	
1530	D7504	0.108		0.46	
1538		-----		-----	
1653		-----		-----	
1669	D7504	0.08		-1.96	
1812	D7504	0.1104		0.67	
6201	D7504	0.1067		0.35	
6262		-----		-----	

	normality	OK	
	n	16	
	outliers	1	
	mean (n)	0.10262	
	st.dev. (n)	0.011138	
	R(calc.)	0.03119	
	st.dev.(Horwitz)	0.011565	
	R(Horwitz)	0.03238	4 components
Compare			
	R(D7504:18)	0.05800	Table 9 of D7504:18: R = 0.0013 at 0.0023 %M/M

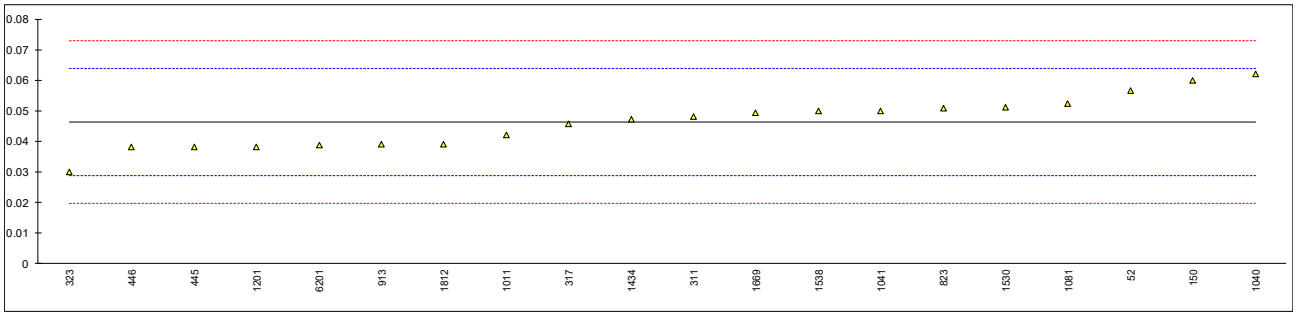


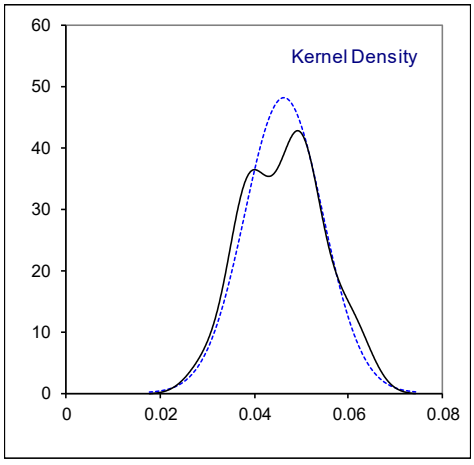


Determination of Non-aromatics on sample #19197; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0565		1.16	
150	D6563	0.06		1.55	
171		-----		-----	
311	D7504	0.048		0.19	
317	D7504	0.0458		-0.06	
323	D6563	0.03		-1.85	
445	D2360	0.0380		-0.94	
446	D6563	0.038		-0.94	
551		-----		-----	
555		-----		-----	
823	D6563	0.0509		0.52	
862		-----		-----	
913	D7504	0.039		-0.83	
1011	D5917	0.042		-0.49	
1040	D7504	0.062		1.78	
1041	D6563	0.05		0.42	
1081	D6563	0.0522364		0.67	
1091		-----		-----	
1201	D6563	0.0381		-0.93	
1294		-----		-----	
1434	D4492	0.04728		0.11	
1530	D7504	0.051		0.53	
1538	D7504	0.0499		0.41	
1653		-----		-----	
1669	D7504	0.0494		0.35	
1812	D7504	0.039		-0.83	
6201	D7504	0.0387		-0.86	
6262		-----		-----	

	normality	OK	
	n	20	
	outliers	0	
	mean (n)	0.04629	
	st.dev. (n)	0.008305	
	R(calc.)	0.02326	
	st.dev.(Horwitz)	0.008821	
	R(Horwitz)	0.02470	9 components
Compare			
	R(D7504:18)	0.00538	Table 9 of D7504:18: R = 0.0219 at 0.1883 %M/M





APPENDIX 2

Number of participants per country

3 labs in	BELGIUM
3 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	ISRAEL
5 labs in	NETHERLANDS
1 lab in	POLAND
1 lab in	PORTUGAL
1 lab in	SAUDI ARABIA
1 lab in	SOUTH KOREA
1 lab in	SPAIN
2 labs 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 = possibly an error in calculations
W = test result withdrawn on request of participant
ex = test result excluded from statistical evaluations
n.a. = not applicable
n.e. = not evaluated
n.d. = not detected
SDS = Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ASTM E178:02
3 ASTM E1301:03
4 ISO13528:15
5 ISO5725:86
6 ISO5725, parts 1-6, 1994
7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
8 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
9 IP 367:84
10 DIN 38402 T41/42
11 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
12 J.N. Miller, Analyst, 118, 455, (1993)
13 Analytical Methods Committee Technical brief, No 4, January 2001.
14 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364 (2002)
15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)
16 Horwitz, R. Albert, J. AOAC Int. 79-3, 589 (1996)