Results of Proficiency Test ortho- and para-Xylene September 2012

Organised by: Institute for Interlaboratory Studies (iis)
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1995, the Institute for Interlaboratory Studies organizes a proficiency test for the analyses of o- and p-Xylene once per every two years. As part of the annual proficiency test program of 2012/2013, it was decided to continue this proficiency test on o- and p-Xylene. In this interlaboratory study, 30 laboratories from 21 different countries have participated. See appendix 2 for the number of participants per country. In this report, the results of the proficiency test are presented and discussed.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser of this proficiency test. Sample analyses for fit-for-use and homogeneity testing were subcontracted. It was decided to send one 0.25 L bottle with o-Xylene (labelled #12101) and one 0.5 L bottle with p-Xylene (labelled #12102). The participants were requested to report rounded and unrounded results. The unrounded 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/IEC 17043:2010, since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentially 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 organisation 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 January 2010 (iis-protocol, version 3.2).

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 samples were prepared. The first batch, approx. 20 litre o-Xylene, purchased from a Dutch chemical supplier, was homogenised and subsequently divided over 50 brown glass bottles of 0.25L with inner and outer caps (labelled #12101). The homogeneity of the subsamples was checked by determination of Density @ 15°C in accordance with ASTM D4052:02e1 and p-Xylene in accordance with ASTM D 3797:05 on 8 stratified randomly selected samples.

	Density @15°C in kg/L	*p-Xylene in %M/M*
sample #12101-1	0.88360	1.648
sample #12101-2	0.88360	1.587
sample #12101-3	0.88360	1.574
sample #12101-4	0.88360	1.535
sample #12101-5	0.88359	1.562
sample #12101-6	0.88360	1.554
sample #12101-7	0.88360	1.529
sample #12101-8	0.88360	1.538

Table 1: homogeneity test results of subsamples #12101 (o-Xylene)

From the above test results, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density @15°C in kg/L	*p-Xylene in %M/M*
r (measured)	0.00001	0.1085
Reference method	ASTM D4052:02e1	ASTM D3797:05
0.3* R (reference method)	0.00015	0.1615

Table 2: repeatabilities on subsamples #12101

The second batch, approx. 20 litre of p-Xylene, also purchased from a Dutch chemical supplier, was homogenised and subsequently divided over 43 brown glass bottles of 0.5 L with inner and outer caps (labelled #12102). The homogeneity of the subsamples #12102 was checked by determination of Density @15°C in accordance with ASTM D4052:02e1 and Ethylbenzene in accordance with ASTM D 3798:03 on 7 stratified randomly selected samples.

	Density @15°C in kg/L	*Ethylbenzene in %M/M*
sample #12102-1	0.86523	0.115
sample #12102-2	0.86523	0.119
sample #12102-3	0.86523	0.120
sample #12102-4	0.86523	0.113
sample #12102-5	0.86522	0.114
sample #12102-6	0.86523	0.112
sample #12102-7	0.86522	0.115

Table 3: homogeneity test results of subsamples #12102 (p-Xylene)

From the above test results, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density @15°C in kg/L	*Ethylbenzene in %M/M*
r (measured)	0.00002	0.008
Reference method	ASTM D4052:02e1	ASTM D3798:03
0.3* R (reference method)	0.00015	0.009

Table 4: repeatabilities on subsamples #12102

Each calculated repeatability was less than 0.3 times the corresponding reproducibility of the reference method. Therefore, homogeneity of the samples was assumed.

To each of the participating laboratories 1 bottle of 0.25 L with o-Xylene (labelled #12101) and 1 bottle of 0.50 L with p-Xylene (labelled #12102) were sent on September 5, 2012.

2.5 STABILITY OF THE SAMPLES

The stability of o-Xylene and p-Xylene, packed in the brown glass bottles of 0.25 L and 0.5 L was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine on sample #12101 (o-Xylene): Purity and Impurities (m- and p-Xylene, Ethylbenzene, Styrene, Sum of Ethyltoluenes, n-Propylbenzene, iso-Propylbenzene (Cumene), Toluene, Non aromatics and other Aromatics).
On sample #12102 (p-Xylene) was requested to determine: Appearance, Colour Pt/Co, Density at 20ºC, Distillation (Initial Boiling Point (IBP), 50% Distillation Point and Dry Point (DP)), Organic Chloride, Sulphur, Purity and Impurities (Non-aromatics, Toluene, Styrene, Ethylbenzene, m- and o-Xylene).

To get comparable results a detailed report form, on which the units were prescribed as well as some of the required standards and a letter of instructions were prepared and

made available for download on the iis website (www.iisnl.com).
A SDS and a form to confirm receipt of the samples were added to the sample package

3 RESULTS

During four weeks after sample despatch, the results of the individual laboratories were gathered. The original data are tabulated per determination in appendix 1 of this report. The laboratories are represented by their code numbers.

Directly after the deadline, a reminder fax was sent to the laboratories that had not reported results at that moment. Shortly after the deadline, the available results were screened for suspect data. A 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 results. Additional or corrected results are used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1.

3.1 STATISTICS

Statistical calculations were performed as described in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of January 2010 (iis-protocol, version 3.2).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded results. 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. After removal of outliers, this check was repeated. In case a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.
In accordance to ISO 5725 (1986 and 1994) the original results per determination were submitted subsequently to Dixon and Grubbs outlier tests. Outliers are marked by D(0.01) for the Dixon test and by G(0.01) or DG(0.01) for the Grubbs test. Stragglers are marked by D(0.05) for the Dixon test and by G(0.05) or DG(0.05) for the Grubbs test. Both outliers and stragglers were not included in the calculations of the averages and the 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. When the uncertainty passed the evaluation no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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

3.2 GRAPHICS

In order to visualise 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 analysis results are plotted. The corresponding laboratory numbers are under 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 standard. 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 (see appendix 3; no.12 and 13)

3.3 Z-SCORES

As it was decided to evaluate the performance of the participants against the literature requirements, e.g. ASTM reproducibilities, the z-scores were calculated using a target standard deviation. This target standard deviation was calculated from the literature reproducibility by division with 2.8.

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 the fit-for-useness of the reported test result.

The z-scores were calculated according to:

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

To evaluate the performance of the participating laboratories the z-scores were calculated. 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:

	$\lvert z \rvert < 1$	good
$1 <$	$\lvert z \rvert < 2$	satisfactory
$2 <$	$\lvert z \rvert < 3$	questionable
	$\lvert z \rvert > 3$	unsatisfactory

4 EVALUATION

In this proficiency test some problems were encountered with the despatch of the samples to Brazil and Iran. Due to custom clearance problems, several laboratories did receive the samples near or after the final reporting date.
Three participants did not report any test results and five participants did report test results after the final reporting date. Finally, 27 participants did report in total 471 numerical test results.
Observed were 27 outlying test results, which is 5.7%. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

4.1 EVALUATION PER TEST

In this section, the results are discussed per sample and per test.
Not all original data sets proved to have a normal distribution. On sample #12101, not normal distributions were found for the following determinations: p-Xylene, m-Xylene, Styrene, Sum of Ethyltoluenes and iso-Propylbenzene.
On sample #12102, not normal distributions were found for the following determinations: Colour Pt/Co, Density @ 20°C, 50% Boiling Point, Nonaromatics, Toluene, Styrene and Ethylbenzene. The statistical evaluation for these determinations should be used with care.
Unfortunately, not for all determinations a suitable standard test method exists with precision data. For these determinations, the observed spreads were compared against the (strict) spreads estimated from the Horwitz equation.

Sample #12101 o-Xylene:

Purity: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in agreement with the requirements of ASTM D3797:05.

p-Xylene: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D3797:05.
One laboratory probably mixed up the test result for p-Xylene with the test result for m-Xylene. This result was changed by iis.

m-Xylene: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3797:05.
One laboratory probably mixed up the test result for m-Xylene with the test result for p-Xylene. This result was changed by iis.

Ethylbenzene: 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 requirements of ASTM D3797:05.

Styrene: This determination was problematic for two laboratories. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D3797:05.

Sum of Ethyltoluenes: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements estimated from the Horwitz equation.

n-Propylbenzene: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements estimated from the Horwitz equation.

iso-Propylbenzene: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3797:05.

Toluene: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3797:05.

Other Aromatics: Only eight numerical results were reported. Two laboratories were excluded from the statistical evaluation. One laboratory did not report any test results for Ethyltoluenes, nor for Styrene. Therefore its result for ‘other aromatics’ may include the contents for Ethyltoluenes and Styrene. Another laboratory reported a very low test result for Ethyltoluenes. Therefore its result for ‘other aromatics’ may include the contents for Ethyltoluenes.

Nonaromatics: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D3797:05.

Sample #12102 p-Xylene:

Appearance: A new standardized method is available for Appearance since 2009, being ASTM E2680. However, not all participants did report according

this method. All participants agreed about the appearance of sample #12102. Participants who used the ASTM E2680 should report the Appearance as 'pass' (or 'fail'). Eleven participants reported the appearance correctly as pass. The other laboratories used different kind of terms or abbreviations like: Clear, B&C, C&F and CFFSM. The explanations for the used abbreviations are given on page 25.

Colour Pt/Co: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in agreement with the requirements of ASTM D1209:11.

Density: This determination was not problematic. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the outlier is in good agreement with the requirements of ASTM D4052:02e1.
The current version of the test method ASTM D4052:11 is only valid for gasolines, distillates, basestocks and lubricating oils. Therefore this 2011 version is not applicable for p-Xylene.

Distillation: This determination was not problematic. Only one statistical outlier was observed. The calculated reproducibilities of IBP and 50% IBP are respectively in agreement and almost with the requirements of ASTM D850:11. The calculated reproducibility of Dry Point is not in agreement with the requirements of ASTM D850:11. Seven participants did obviously not correct for the theoretical mid boiling point of 138.3ºC (see ASTM D850:11).

Organic chloride: No significant conclusions were drawn as the concentration Organic chloride was near or below the application range (0.3 – 1000 mg/kg) of the test method UOP779:08.

Purity: This determination was problematic. Five statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is not agreement with the requirements of ASTM D3798:03.

Nonaromatics: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3798:03.

Toluene: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3798:03.

Styrene: This determination was not problematic. One statistical outlier and one false negative test result were observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements estimated from the Horwitz equation.

Ethylbenzene: 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 requirements of ASTM D3798:03

m-Xylene: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D3798:03.

o-Xylene: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D3798:03.

Sulphur: No significant conclusions were drawn as the sulphur concentration was below the application range (1 – 8000 mg/kg) of the test method ASTM D5453:09.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant standard and the reproducibility as found for the group of participating laboratories. The average results per sample, calculated reproducibilities and reproducibilities derived from literature standards (in casu ASTM standards), are compared in the next tables.

Parameter	unit	n	average	2.8 *sd_R	R (lit)
o-Xylene	%M/M	19	97.855	0.319	0.418
p-Xylene	%M/M	16	1.486	0.087	0.511
m-Xylene	%M/M	18	0.124	0.016	0.030
Ethylbenzene	%M/M	17	0.033	0.003	0.015
Styrene	%M/M	13	0.0055	0.0017	0.0022
Sum of Ethyltoluenes	%M/M	9	0.061	0.016	0.015
n-Propylbenzene	%M/M	12	0.042	0.004	0.008
i-Propylbenzene	%M/M	17	0.102	0.015	0.026
Toluene	%M/M	19	0.038	0.006	0.010
Other Aromatics	%M/M	6	0.045	0.045	unknown
Non-aromatics	%M/M	17	0.231	0.058	0.171

Table 5: reproducibilities for sample o-Xylene #12101

Parameter	unit	n	average	2.8 *sd_r	R(lit)
Appearance	---	24	pass	n.a.	n.a.
Colour Pt/Co	---	24	10.4	7.4	7.0
Density @ 20°C	kg/L	21	0.8609	0.0002	0.0005
Initial Boiling Point	°C	22	137.5	1.01	0.96
50% Boiling Point	°C	21	138.3	0.38	0.44
Dry Point	°C	21	138.7	0.59	0.39
Organic Chloride	mg/kg	14	<0.3	n.a.	n.a.
p-Xylene	%M/M	20	99.806	0.138	0.092
Non-aromatics	%M/M	24	0.091	0.061	0.176
Toluene	%M/M	25	0.058	0.008	0.037
Styrene	%M/M	10	0.0051	0.0010	0.0013
Ethylbenzene	%M/M	23	0.130	0.020	0.034
m-Xylene	%M/M	21	0.254	0.050	0.044
o-Xylene	%M/M	25	0.060	0.068	0.120
Sulphur	mg/kg	15	0.27	0.27	(0.22)

Table 6: reproducibilities for sample p-Xylene #12102

NB Results between brackets should be used with care as the consensus value is outside the application range of the test method

Without further statistical calculations, it can be concluded that for all tests there is a good compliance of the group of participating laboratories with the relevant standards. The problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE SEPTEMBER 2012 PROFICIENCY TEST WITH PREVIOUS PT RESULTS

	September 2012	October 2010	November 2008	November 2006
Number of reporting labs	27	26	26	21
Number of results reported	471	471	502	425
Statistical outliers	27	41	33	21
Percentage outliers	5.7%	8.7%	6.6%	4.9%

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 against the requirements of the respective standards. The conclusions are given the following table:

Determination	September 2012	October 2010	November 2008	November 2006
o-Xylene	+	++	++	++
p-Xylene	++	++	++	++
m-Xylene	++	++	+/-	++
Ethylbenzene	++	++	++	++
Styrene	++	++	++	++
Sum of Ethyltoluenes *)	+/-	-	++	++
n-Propylbenzene *)	++	-	+/-	++
i-Propylbenzene	++	++	-	++
Toluene	++	++	++	++
Other Aromatics	n.e.	n.e.	n.e.	n.e.
Non-aromatics	++	++	++	++

Table 8: comparison determinations of sample #12101 (o-xylene) against the standard methods

Determination	September 2012	October 2010	November 2008	November 2006
Colour Pt/Co	+	--	++	+
Density @ 20°C	++	++	++	++
Initial Boiling Point	+	++	++	++
50% Boiling Point	+/-	+/-	n.e.	n.e.
Dry Point	-	++	-	+
Organic chloride	n.e	n.e.	n.e.	++
p-Xylene	-	++	++	++
Non-aromatics	++	++	++	++
Toluene	++	++	++	++
Styrene *)	-	n.e.	++	++
Ethylbenzene	++	++	++	++
m-Xylene	-	--	+/-	--
o-Xylene	++	++	++	++
Sulphur	n.e.	(--)	n.e.	n.e.

Table 9: comparison determinations of sample #12102 (p-xylene) against the standard methods
*) against Horwitz

NB Marks between brackets should be used with care as the consensus value was outside the application range of the test method

The performance of the determinations against the requirements of the respective standards is listed in the above table. The following performance categories were used:

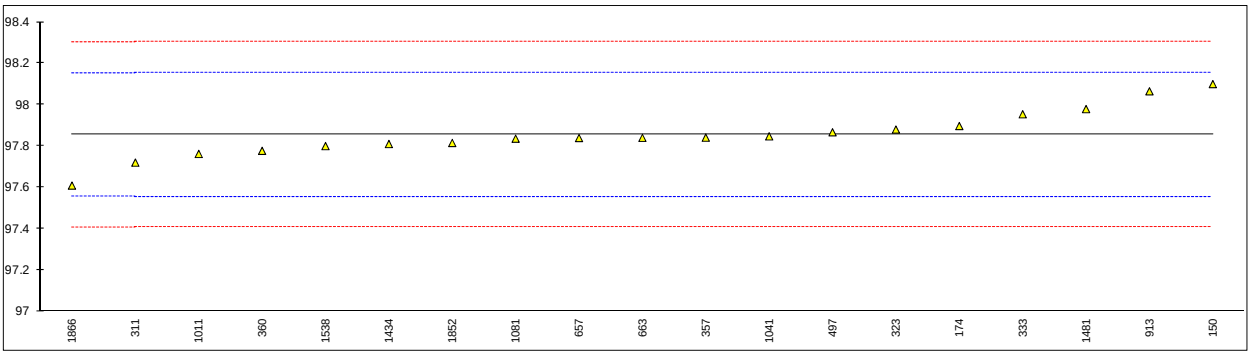
++:	group performed much better than the standard
+ :	group performed better than the standard
+/-:	group performance equals the standard
- :	group performed worse than the standard
-- :	group performed much worse than the standard
n.e.:	not evaluated

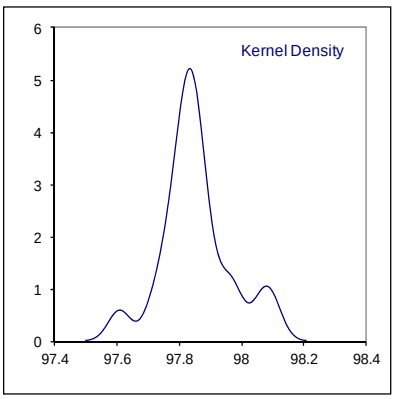
APPENDIX 1

Determination of Purity of o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	98.10		1.64	
158		-----		-----	
171		-----		-----	
174	D7504	97.897		0.28	
311	D3797	97.72		-0.90	
323	D3797	97.88		0.17	
333	D3797	97.954		0.67	
357	D3797	97.841		-0.09	
360	D3797	97.777		-0.52	
391		-----		-----	
444		-----		-----	
497	D3797	97.867		0.08	
551		-----		-----	
657	D3797	97.8391		-0.10	
663	D7504	97.84		-0.10	
913	D3797	98.0653		1.41	
1011	D3797	97.762		-0.62	
1041	in house	97.8472		-0.05	
1067		-----		-----	
1081	D3797	97.836		-0.12	
1434	D3797	97.81		-0.30	
1481	D3797	97.979		0.83	
1538	D7504	97.80		-0.37	
1657		-----		-----	
1852	DIN51437	97.8152		-0.26	
1866	UOP720	97.6089		-1.65	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	OK
n	19
outliers	0
mean (n)	97.8547
st.dev. (n)	0.11382
R(calc.)	0.3187
R(D3797:05)	0.4183

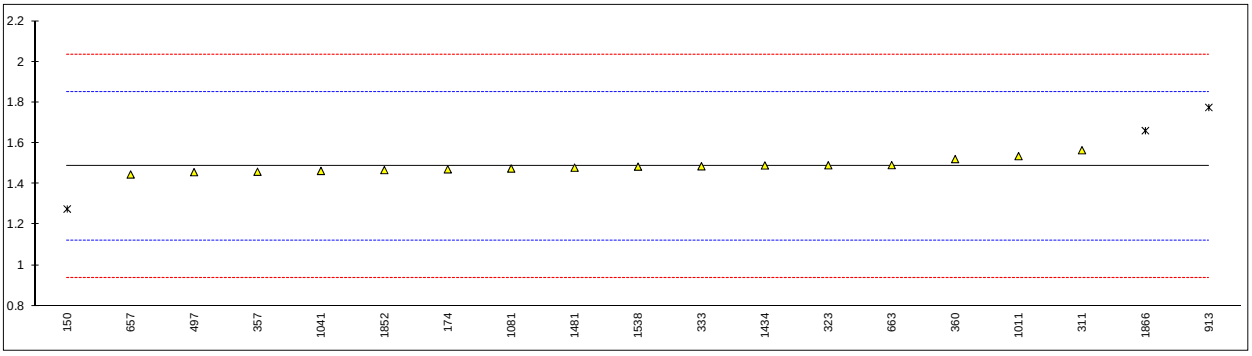


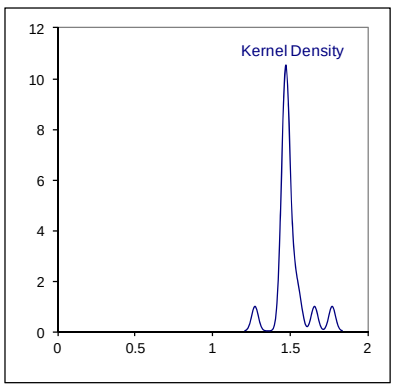


Determination of p-Xylene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	1.276	G(0.05)	-1.15	
158		-----		-----	
171		-----		-----	
174	D7504	1.471		-0.08	
311	D3797	1.565		0.43	
323	D3797	1.491		0.03	
333	D3797	1.486		0.00	
357	D3797	1.459		-0.15	
360	D3797	1.5213		0.19	
391		-----		-----	
444		-----		-----	
497	D3797	1.457	C	-0.16	first reported: 0.124
551		-----		-----	
657	D3797	1.4457		-0.22	
663	D7504	1.4916		0.03	
913	D3797	1.7749	G(0.05)	1.58	
1011	D3797	1.536		0.27	
1041	in house	1.4632		-0.13	
1067		-----		-----	
1081	D3797	1.475		-0.06	
1434	D3797	1.49	C	0.02	reported: 0.125; result mixed up with m-Xylene? Changed by iis
1481	D3797	1.4793		-0.04	
1538	D7504	1.4842		-0.01	
1657		-----		-----	
1852	DIN51437	1.4674		-0.10	
1866	UOP720	1.6608	G(0.01)	0.96	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	not OK
n	16
outliers	3
mean (n)	1.4864
st.dev. (n)	0.03110
R(calc.)	0.0871
R(D3797:05)	0.5110

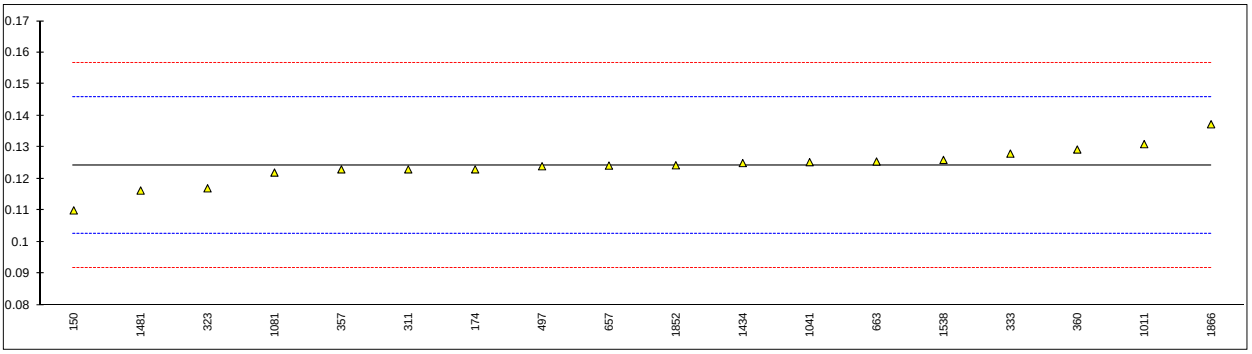


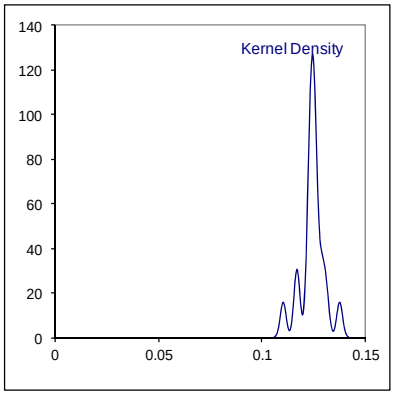


Determination of m-Xylene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.110		-1.31	
158		-----		-----	
171		-----		-----	
174	D7504	0.123		-0.10	
311	D3797	0.123		-0.10	
323	D3797	0.117		-0.66	
333	D3797	0.128		0.36	
357	D3797	0.123		-0.10	
360	D3797	0.1293		0.48	
391		-----		-----	
444		-----		-----	
497	D3797	0.124	C	-0.01	first reported: 1.456
551		-----		-----	
657	D3797	0.1242		0.01	
663	D7504	0.1255		0.13	
913		-----		-----	
1011	D3797	0.131		0.64	
1041	in house	0.1253		0.11	
1067		-----		-----	
1081	D3797	0.122		-0.20	
1434	D3797	0.125	C	0.08	reported 1.49; result mixed up with p-Xylene? changed by iis
1481	D3797	0.1163		-0.72	
1538	D7504	0.1260		0.17	
1657		-----		-----	
1852	DIN51437	0.1243		0.02	
1866	UOP720	0.1373		1.22	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	not OK
n	18
outliers	0
mean (n)	0.1241
st.dev. (n)	0.00589
R(calc.)	0.0165
R(D3797:05)	0.0303

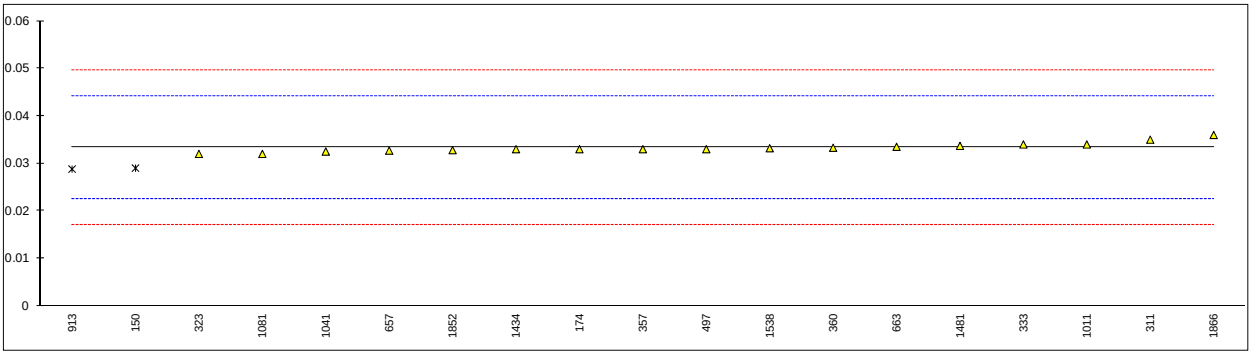


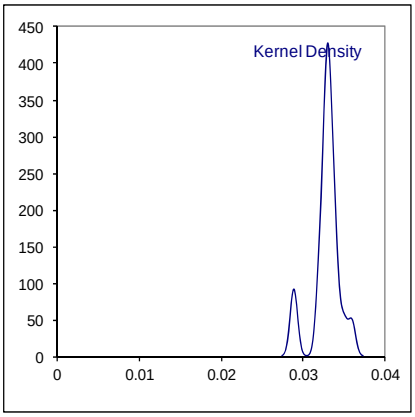


Determination of Ethylbenzene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.029	DG(0.01)	-0.80	
158		-----		-----	
171		-----		-----	
174	D7504	0.033		-0.06	
311	D3797	0.035		0.31	
323	D3797	0.032		-0.25	
333	D3797	0.034		0.12	
357	D3797	0.033		-0.06	
360	D3797	0.0333		-0.01	
391		-----		-----	
444		-----		-----	
497	D3797	0.033		-0.06	
551		-----		-----	
657	D3797	0.0327		-0.12	
663	D7504	0.0335		0.03	
913	D3797	0.0288	DG(0.01)	-0.84	
1011	D3797	0.034		0.12	
1041	in house	0.0325		-0.15	
1067		-----		-----	
1081	D3797	0.032		-0.25	
1434	D3797	0.033		-0.06	
1481	D3797	0.0337		0.07	
1538	D7504	0.0332		-0.03	
1657		-----		-----	
1852	DIN51437	0.0328		-0.10	
1866	UOP720	0.0360		0.49	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	OK
n	17
outliers	2
mean (n)	0.0333
st.dev. (n)	0.00101
R(calc.)	0.0028
R(D3797:05)	0.0152

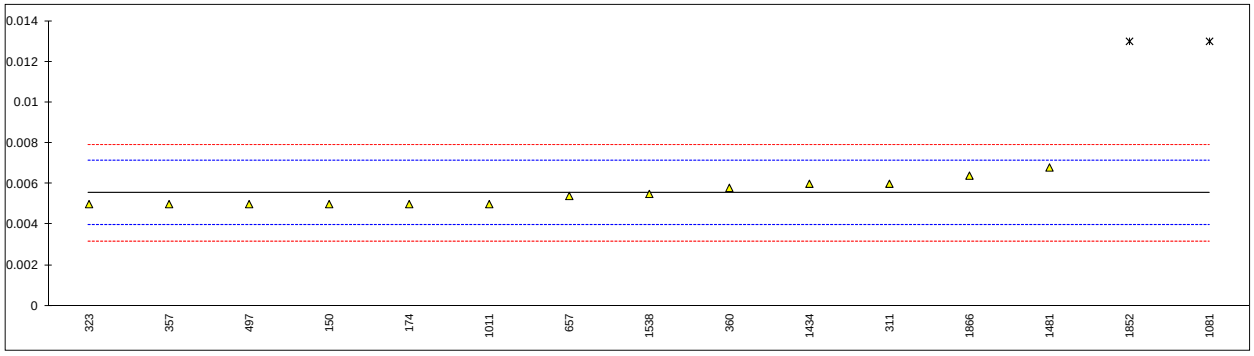


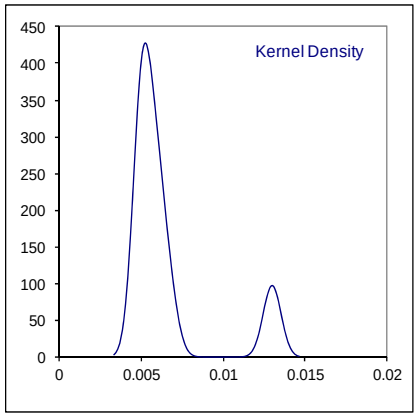


Determination of Styrene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.005		-0.67	
158		-----		-----	
171		-----		-----	
174	D7504	0.005		-0.67	
311	D3797	0.006		0.59	
323	D3797	0.005		-0.67	
333		-----		-----	
357	D3797	0.005		-0.67	
360	D3797	0.0058		0.34	
391		-----		-----	
444		-----		-----	
497	D3797	0.005		-0.67	
551		-----		-----	
657	D3797	0.0054		-0.17	
663		-----		-----	
913		-----		-----	
1011	D3797	0.005		-0.67	
1041	in house	<0.01		-----	
1067		-----		-----	
1081	D3797	0.013	G(0.01)	9.45	
1434	D3797	0.006		0.59	
1481	D3797	0.0068		1.61	
1538	D7504	0.0055		-0.04	
1657		-----		-----	
1852	DIN51437	0.0130	G(0.01)	9.45	
1866	UOP720	0.0064		1.10	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	not OK
n	13
outliers	2
mean (n)	0.0055
st.dev. (n)	0.00062
R(calc.)	0.0017
R(D3797:05)	0.0022

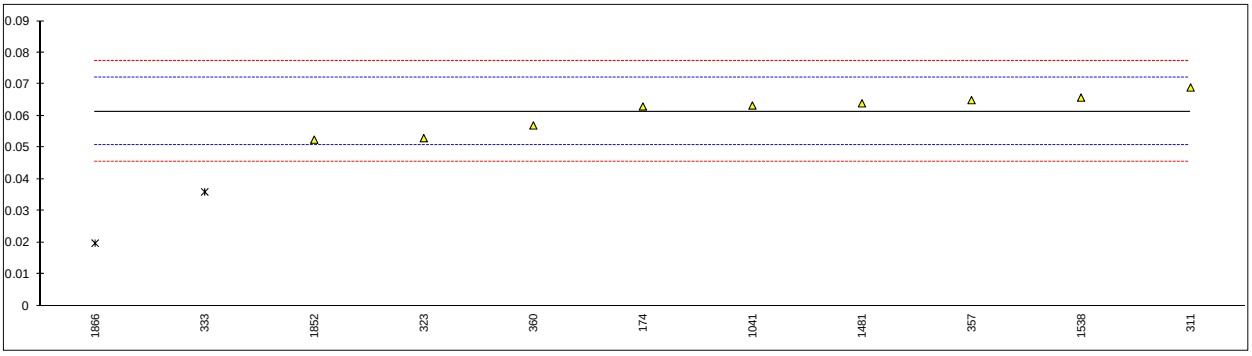


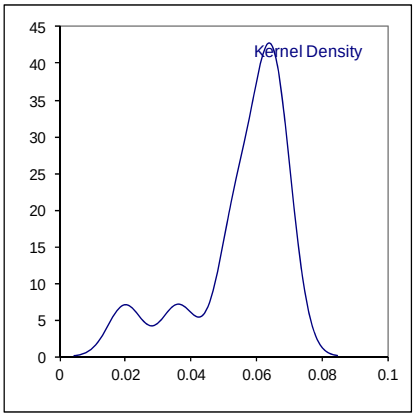


Determination of Sum of Ethyltoluenes in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150		-----		-----	
158		-----		-----	
171		-----		-----	
174	D7504	0.063		0.30	
311	D3797	0.069		1.44	
323	D3797Mod.	0.053	C	-1.59	first reported: 0.041
333	D3797	0.036	G(0.05)	-4.80	
357	D3797	0.065		0.68	
360		0.0570		-0.83	
391		-----		-----	
444		-----		-----	
497		-----		-----	
551		-----		-----	
657		-----		-----	
663		-----		-----	
913		-----		-----	
1011		-----		-----	
1041	in house	0.0633		0.36	
1067		-----		-----	
1081		-----		-----	
1434		-----		-----	
1481		0.0640		0.49	
1538	D7504	0.0658		0.83	
1657		-----		-----	
1852		0.0525		-1.68	
1866	UOP720	0.0198	G(0.05)	-7.87	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	not OK
n	9
outliers	2
mean (n)	0.0614
st.dev. (n)	0.00583
R(calc.)	0.0163
R(Horwitz)	0.0148

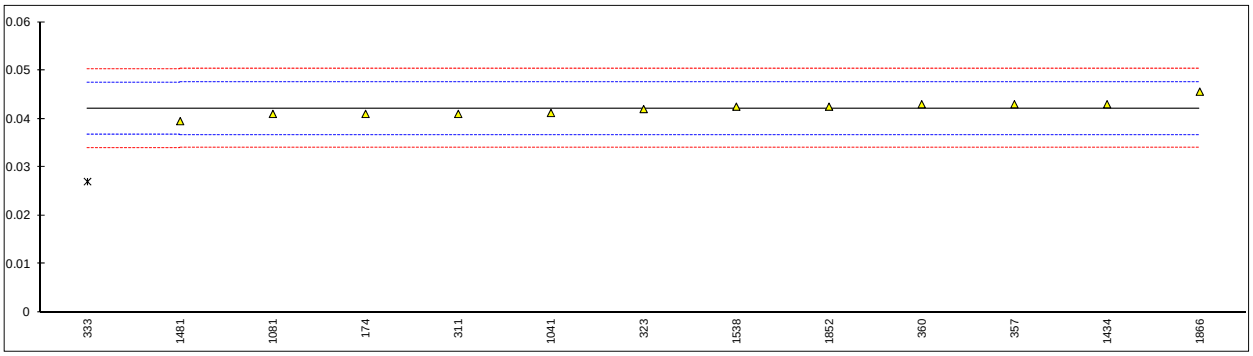


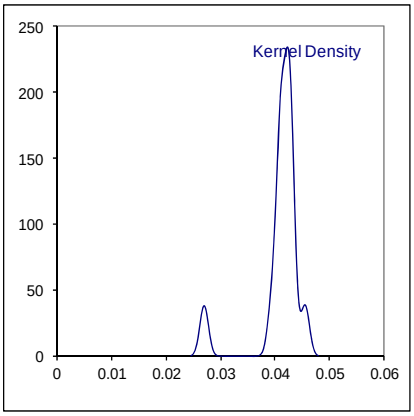


Determination of n-Propylbenzene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150		-----		-----	
158		-----		-----	
171		-----		-----	
174	D7504	0.041		-0.41	
311	D3797	0.041		-0.41	
323	D3797Mod.	0.042		-0.04	
333	D3797	0.027	G(0.01)	-5.57	
357	D3797	0.043		0.33	
360	D3797	0.0430		0.33	
391		-----		-----	
444		-----		-----	
497		-----		-----	
551		-----		-----	
657		-----		-----	
663		-----		-----	
913		-----		-----	
1011		-----		-----	
1041	in house	0.0412		-0.33	
1067		-----		-----	
1081		0.0410		-0.41	
1434		0.043		0.33	
1481		0.0395		-0.96	
1538	D7504	0.0425		0.14	
1657		-----		-----	
1852	DIN51437	0.0425		0.14	
1866	UOP720	0.0456		1.29	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	OK
n	12
outliers	1
mean (n)	0.0421
st.dev. (n)	0.00154
R(calc.)	0.0043
R(Horwitz)	0.0076

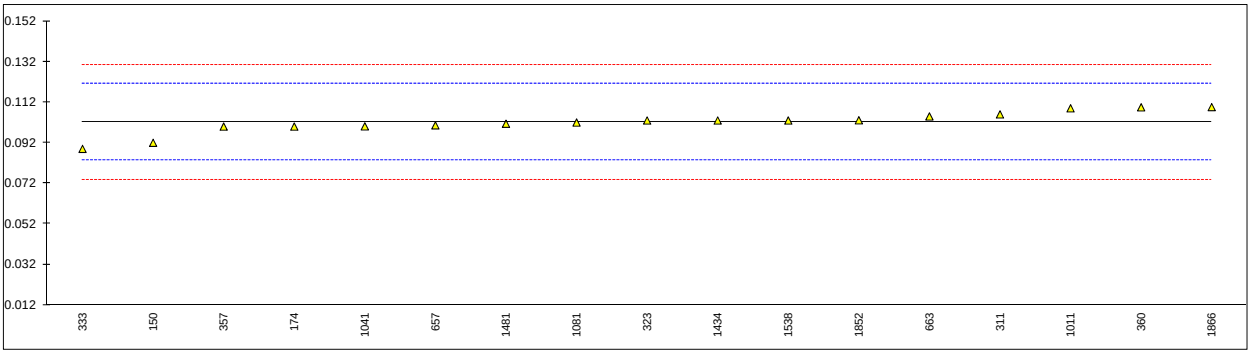


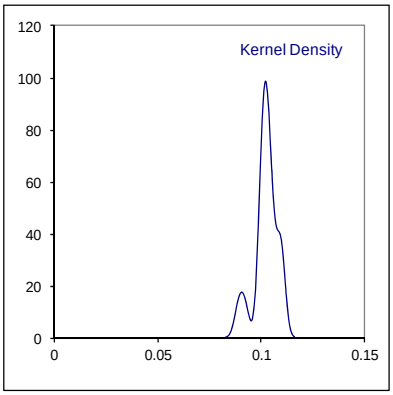


Determination of iso-Propylbenzene (cumene) in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.092		-1.08	
158		-----		-----	
171		-----		-----	
174	D7504	0.100		-0.23	
311	D3797	0.106		0.41	
323	D3797	0.103		0.09	
333	D3797	0.089		-1.40	
357	D3797	0.100		-0.23	
360	D3797	0.1095		0.78	
391		-----		-----	
444		-----		-----	
497		-----		-----	
551		-----		-----	
657	D3797	0.1006		-0.16	
663	D7504	0.1050		0.30	
913		-----		-----	
1011	D3797	0.109		0.73	
1041	in house	0.1001		-0.22	
1067		-----		-----	
1081	D3797	0.1020		-0.01	
1434	D3797	0.103		0.09	
1481	D3797	0.1014		-0.08	
1538	D7504	0.1030		0.09	
1657		-----		-----	
1852	DIN51437	0.1031		0.10	
1866	UOP720	0.1096		0.79	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	not OK
n	17
outliers	0
mean (n)	0.1021
st.dev. (n)	0.00545
R(calc.)	0.0153
R(D3797:05)	0.0263

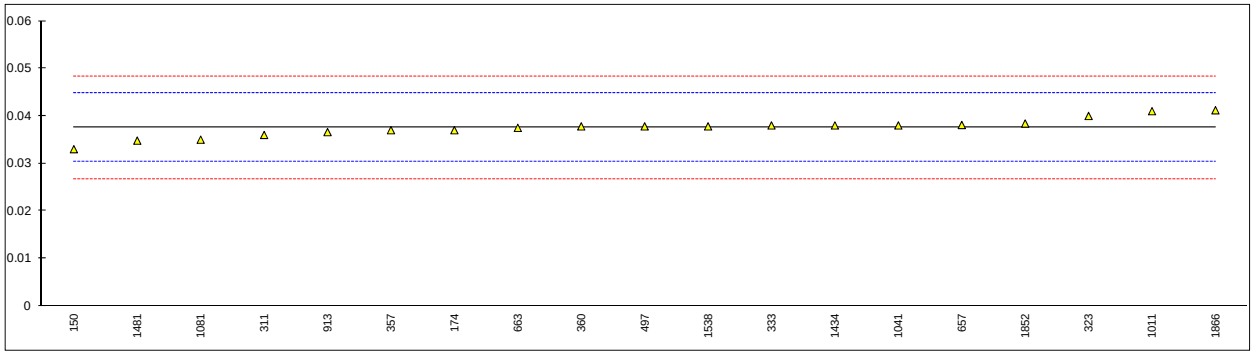


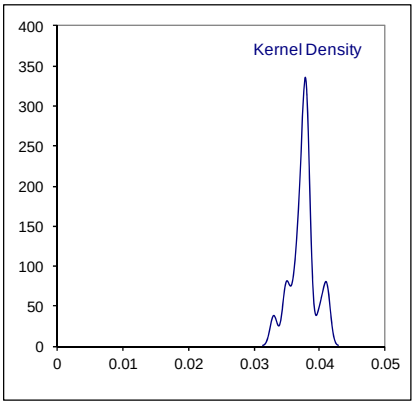


Determination of Toluene in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.033		-1.25	
158		-----		-----	
171		-----		-----	
174	D7504	0.037		-0.15	
311	D3797	0.036		-0.42	
323	D3797	0.040		0.68	
333	D3797	0.038		0.13	
357	D3797	0.037		-0.15	
360	D3797	0.0378		0.08	
391		-----		-----	
444		-----		-----	
497	D3797	0.0378		0.08	
551		-----		-----	
657	D3797	0.0381		0.16	
663	D7504	0.0375		-0.01	
913	D3797	0.0366		-0.26	
1011	D3797	0.041		0.96	
1041	in house	0.0380		0.13	
1067		-----		-----	
1081	D3797	0.035		-0.70	
1434	D3797	0.038		0.13	
1481	D3797	0.0348		-0.75	
1538	D7504	0.0378		0.08	
1657		-----		-----	
1852	DIN51437	0.0384		0.24	
1866	UOP720	0.0412		1.02	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	OK
n	19
outliers	0
mean (n)	0.0375
st.dev. (n)	0.00200
R(calc.)	0.0056
R(D3797:05)	0.0101

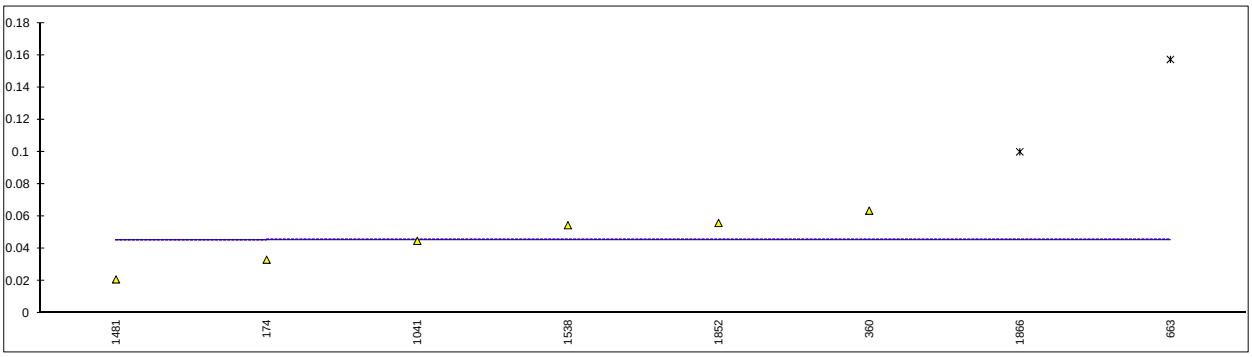




Determination of Other Aromatics in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150		-----		-----	
158		-----		-----	
171		-----		-----	
174	D7504	0.033		-----	
311		-----		-----	
323		-----		-----	
333		-----		-----	
357		-----		-----	
360	D3797	0.0634		-----	
391		-----		-----	
444		-----		-----	
497		-----		-----	
551		-----		-----	
657		-----		-----	
663	D7504	0.1572	ex	-----	result excluded, Ethyltoluenes + Styrene may be included
913		-----		-----	
1011		-----	W	-----	result withdrawn, first reported: 0.116
1041	in house	0.0447		-----	
1067		-----		-----	
1081		-----		-----	
1434		-----		-----	
1481	D3797	0.0208		-----	
1538	D7504	0.0544		-----	
1657		-----		-----	
1852	DIN51437	0.0558		-----	
1866	UOP720	0.0999	ex	-----	result excluded, Ethyltoluenes may be included
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

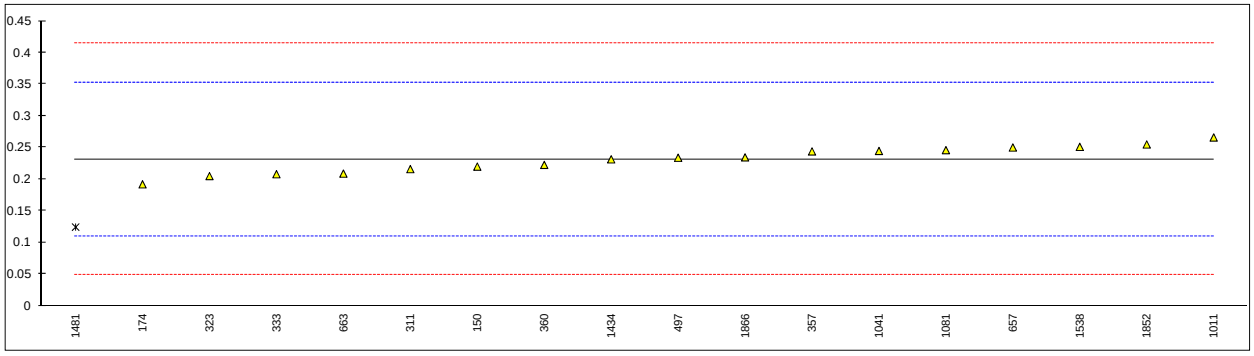
normality	OK
n	6
outliers	2
mean (n)	0.0454
st.dev. (n)	0.01595
R(calc.)	0.0447
R(lit)	unknown

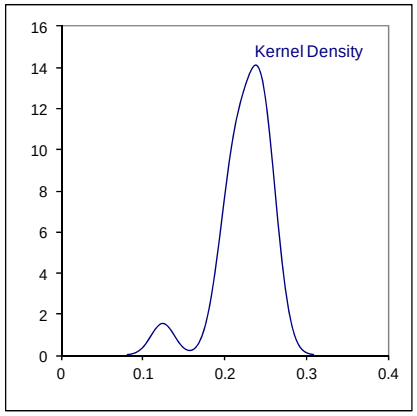


Determination of Nonaromatics in o-Xylene sample #12101; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
150	D3797	0.220		-0.18	
158		-----		-----	
171		-----		-----	
174	D7504	0.192		-0.64	
311	D3797	0.216		-0.25	
323	D3797	0.205		-0.43	
333	D3797	0.208		-0.38	
357	D3797	0.244		0.21	
360	D3797	0.2227		-0.14	
391		-----		-----	
444		-----		-----	
497	D3797	0.234		0.05	
551		-----		-----	
657	D3797	0.2502		0.31	
663	D7504	0.2089		-0.37	
913		-----		-----	
1011	D3797	0.266		0.57	
1041	in house	0.2447		0.22	
1067		-----		-----	
1081	D3797	0.246		0.24	
1434	D3797	0.2315		0.01	
1481	D3797	0.1244	G(0.01)	-1.75	
1538	D7504	0.2512		0.33	
1657		-----		-----	
1852	DIN51437	0.2550		0.39	
1866	UOP720	0.2346		0.06	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

normality	OK
n	17
outliers	1
mean (n)	0.2312
st.dev. (n)	0.02063
R(calc.)	0.0578
R(D3797:05)	0.1707





Determination of Appearance on p-Xylene sample #12102;

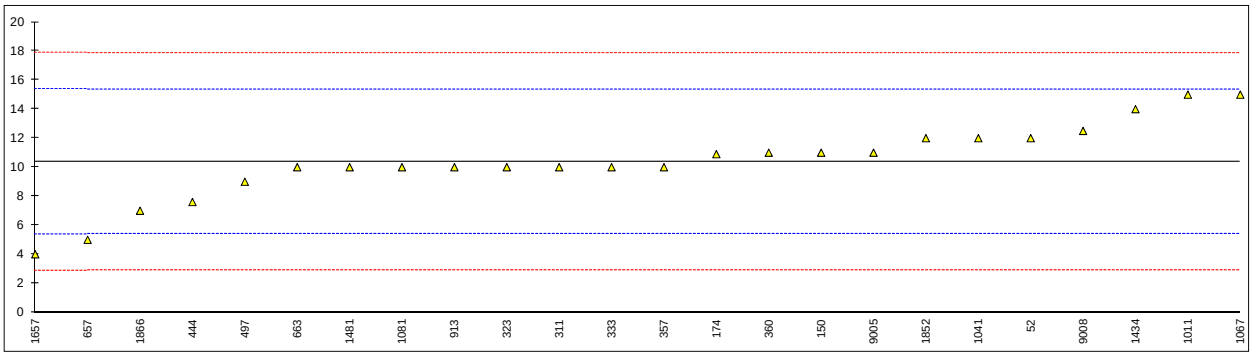
lab	method	value	mark	z(targ)	remarks
52	visual	pass		-----	
150	E2680	pass		-----	
158		-----		-----	
171	E2680	C&F		-----	
174	E2680	pass		-----	
311	E2680	C&B		-----	
323	E2680	pass		-----	
333	E2680	C&B		-----	
357	E2680	pass		-----	
360	E2680	C&B		-----	
391	E2680	pass		-----	
444	E2680	pass		-----	
497	E2680	C&B		-----	
551		-----		-----	
657	E2680	pass		-----	
663	E2680	pass		-----	
913	E2680	CFFSM		-----	
1011	visual	Clear		-----	
1041	visual	CFFSM		-----	
1067	E2680	pass		-----	
1081	E2680	C&B		-----	
1434	E2680	Clear		-----	
1481	E2680	C&B		-----	
1538		-----		-----	
1657		-----		-----	
1852		-----		-----	
1866	E2680	Clear		-----	
7001		-----		-----	
9005	E2680	pass		-----	
9008	D4176	Clear		-----	
	n	24			
	mean (n)	pass			

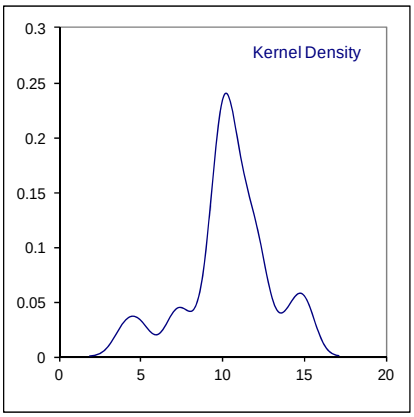
B&C = Bright and Clear
C&F = Clear and Free
CFFSM = Clear Free From Suspended Matter

Determination of Colour Pt/Co on p-Xylene sample #12102;

lab	method	value	mark	z(targ)	remarks
52	D5386	12		0.65	
150	D1209	11		0.25	
158		-----		-----	
171	D1209	<5		-----	
174	D1209	10.9		0.21	
311	D1209	10		-0.15	
323	D1209	10		-0.15	
333	D1209	10		-0.15	
357	D1209	10		-0.15	
360	D1209	11		0.25	
391		-----		-----	
444	D5386	7.6		-1.11	
497	D1209	9		-0.55	
551		-----		-----	
657	D1209	5		-2.15	
663	D1209	10		-0.15	
913	D5386	10.0		-0.15	
1011	D1209	15		1.85	
1041	ISO6271	12		0.65	
1067	D1209	15		1.85	
1081	D1209	10		-0.15	
1434	D1209	14		1.45	
1481	D1209	10		-0.15	
1538		-----		-----	
1657	D1209	4		-2.55	
1852	ISO6271	12		0.65	
1866	D1209	7		-1.35	
7001		-----		-----	
9005	D5386	11.0		0.25	
9008	D5386	12.5		0.85	

normality	not OK
n	24
outliers	0
mean (n)	10.4
st.dev. (n)	2.65
R(calc.)	7.4
R(D1209:11)	7.0

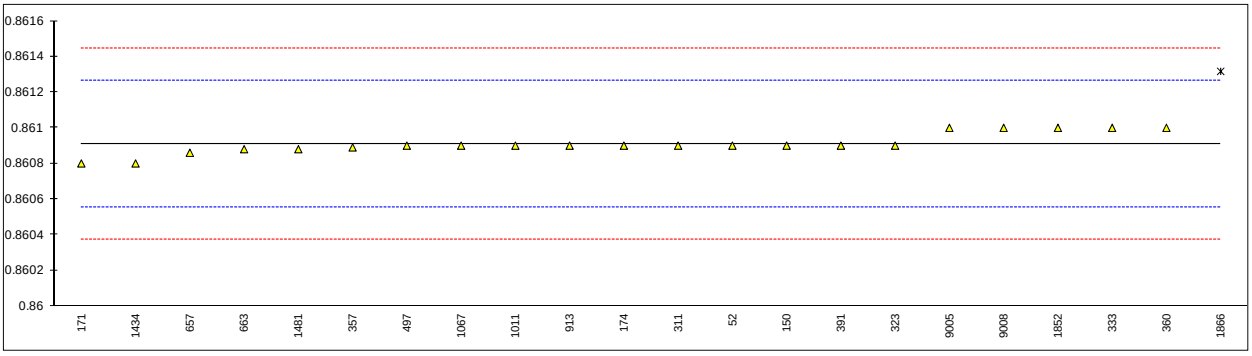


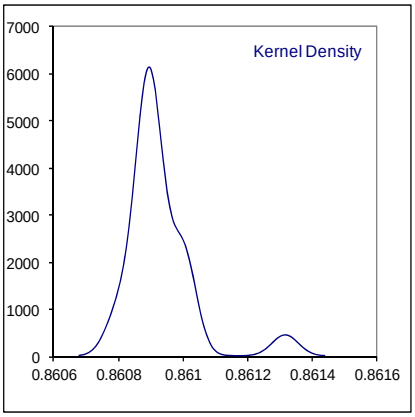


Determination of Density @ 20°C on p-Xylene sample #12102; results in kg/L.

lab	method	value	mark	z(targ)	remarks
52	D4052	0.8609	C	-0.06	first reported: 860.9
150	D4052	0.8609		-0.06	
158		-----		-----	
171	D4052	0.8608		-0.62	
174	D4052	0.8609		-0.06	
311	D4052	0.8609	C	-0.06	first reported: 0.8653
323	D4052	0.8609		-0.06	
333	D4052	0.8610		0.50	
357	D4052	0.86089		-0.11	
360	D4052	0.8610		0.50	
391	D4052	0.8609		-0.06	
444		-----		-----	
497	D4052	0.8609		-0.06	
551		-----		-----	
657	D4052	0.86086		-0.28	
663	D4052	0.86088		-0.17	
913	D4052	0.8609		-0.06	
1011	D4052	0.8609		-0.06	
1041		-----		-----	
1067	D4052	0.8609		-0.06	
1081		-----		-----	
1434	D4052	0.8608		-0.62	
1481	D4052	0.86088		-0.17	
1538		-----		-----	
1657		-----		-----	
1852	ISO3675	0.8610		0.50	
1866	D4052	0.861317	G(0.01)	2.28	
7001		-----		-----	
9005	D4052	0.86100		0.50	
9008	D4052	0.8610		0.50	

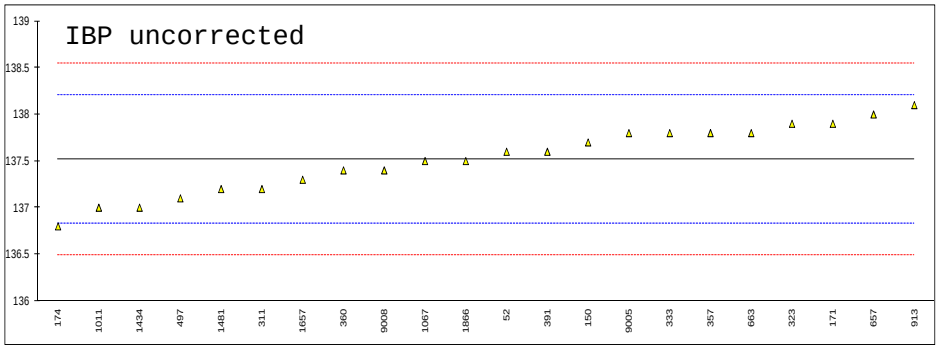
normality	not OK
n	21
outliers	1
mean (n)	0.8609
st.dev. (n)	0.00006
R(calc.)	0.0002
R(D4052:02e1)	0.0005

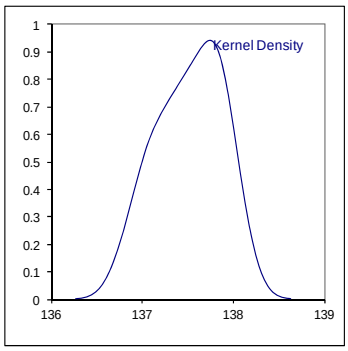


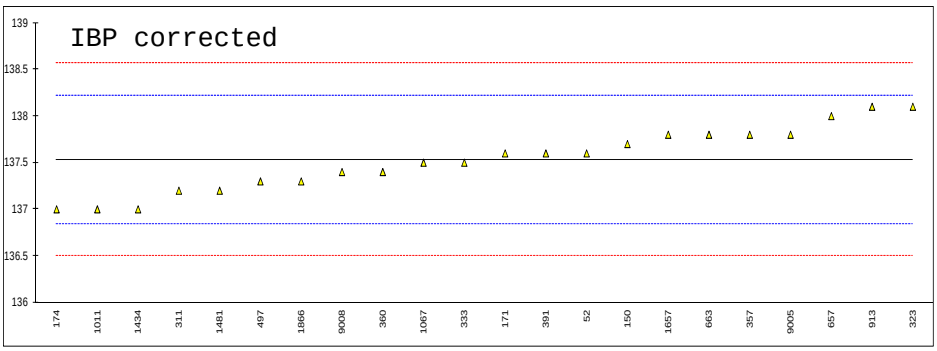


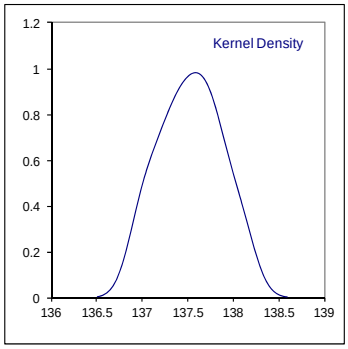
Determination of IBP on sample #12102; results in °C

lab	method	value	mark	z(targ)	value after manual correction	z(targ)	remarks
52	D850-A	137.6		0.24	137.6	0.20	
150	D850-A	137.7		0.53	137.7	0.49	
158		-----		-----	-----	-----	
171	D850-A	137.9		1.11	137.6	0.20	
174	D850-A	136.8		-2.09	137	-1.54	
311	D850-A	137.2		-0.92	137.2	-0.96	
323	D850-M	137.9		1.11	138.1	1.65	
333	D850-A	137.8		0.82	137.5	-0.09	
357	D850-A	137.8		0.82	137.8	0.78	
360	D850-A	137.4		-0.34	137.4	-0.38	
391	D850-M	137.6		0.24	137.6	0.20	
444		-----		-----	-----	-----	
497	D850-A	137.1		-1.21	137.3	-0.67	
551		-----		-----	-----	-----	
657	D850-M	138.0		1.40	138.0	1.36	
663	D850-A	137.8		0.82	137.8	0.78	
913	D850-M	138.1		1.69	138.1	1.65	
1011	D850-A	137.0		-1.51	137.0	-1.54	
1041		-----		-----	-----	-----	
1067	D850-M	137.5		-0.05	137.5	-0.09	
1081		-----		-----	-----	-----	
1434	D850-A	137.0		-1.51	137.0	-1.54	
1481	D850-M	137.2		-0.92	137.2	-0.96	
1538		-----		-----	-----	-----	
1657	D850-A	137.3		-0.63	137.8	0.78	
1852		-----		-----	-----	-----	
1866	D850-	137.5		-0.05	137.3	-0.67	
7001		-----		-----	-----	-----	
9005	D850-A	137.8		0.82	137.8	0.78	
9008	D850-	137.4		-0.34	137.4	-0.38	
	normality	OK			OK		
	n	22			22		
	outliers	0			0		
	mean (n)	137.52			137.53		
	st.dev. (n)	0.361			0.339		
	R(calc.)	1.01			0.95		
	R(D850:11)	0.96			0.96		





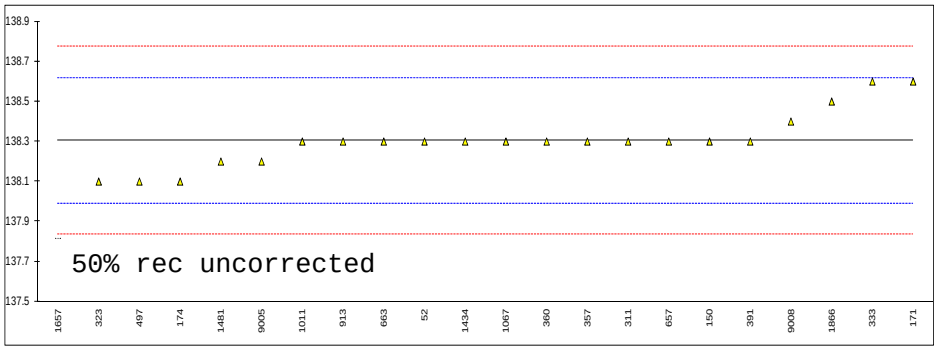


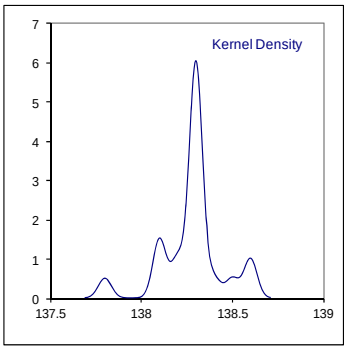


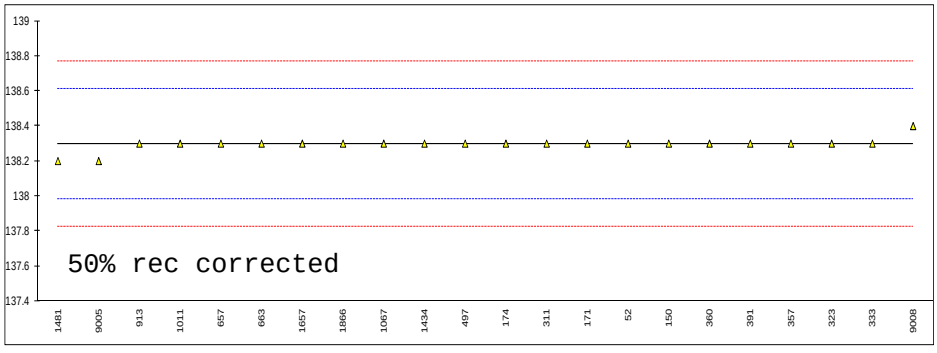
Determination of 50% rec. on sample #12102; results in °C

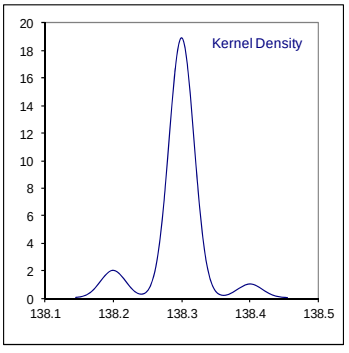
lab	method	value	mark	z(targ)	value after manual correction	z(targ)	remarks
52	D850-A	138.3		-0.03	138.3	0.03	
150	D850-A	138.3		-0.03	138.3	0.03	
158		-----		-----	-----	-----	
171	D850-A	138.6		1.88	138.3	0.03	
174	D850-A	138.1		-1.30	138.3	0.03	
311	D850-A	138.3		-0.03	138.3	0.03	
323	D850-M	138.1		-1.30	138.3	0.03	
333	D850-A	138.6		1.88	138.3	0.03	
357	D850-A	138.3		-0.03	138.3	0.03	
360	D850-A	138.3		-0.03	138.3	0.03	
391	D850-M	138.3		-0.03	138.3	0.03	
444		-----		-----	-----	-----	
497	D850-A	138.1		-1.30	138.3	0.03	
551		-----		-----	-----	-----	
657	D850-M	138.3		-0.03	138.3	0.03	
663	D850-A	138.3		-0.03	138.3	0.03	
913	D850-M	138.3		-0.03	138.3	0.03	
1011	D850-A	138.3		-0.03	138.3	0.03	
1041		-----		-----	-----	-----	
1067	D850-M	138.3		-0.03	138.3	0.03	
1081		-----		-----	-----	-----	
1434	D850-A	138.3		-0.03	138.3	0.03	
1481	D850-M	138.2		-0.67	138.2	-0.61	
1538		-----		-----	-----	-----	
1657	D850-A	137.8	G(0.05)	-3.21	138.3	0.03	
1852		-----		-----	-----	-----	
1866	D850-	138.5		1.24	138.3	0.03	
7001		-----		-----	-----	-----	
9005	D850-A	138.2		-0.67	138.2	-0.61	
9008	D850-	138.4		0.61	138.4	0.67	
	normality	not OK			not OK		
	n	21			22		
	outliers	1			0		
	mean (n)	138.30			138.30		
	st.dev. (n)	0.136			0.038		
	R(calc.)	0.38			0.11		
	R(D850:11)	0.44			0.44		

*Theoretical boiling point = 138.3 ºC



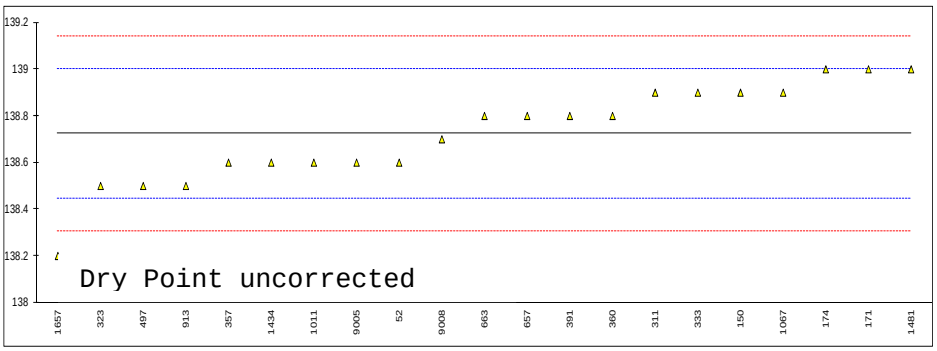


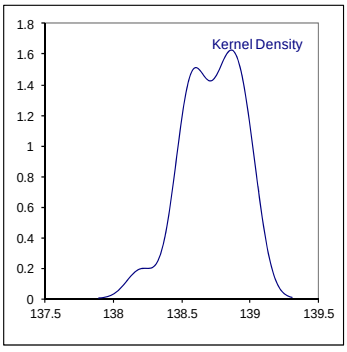


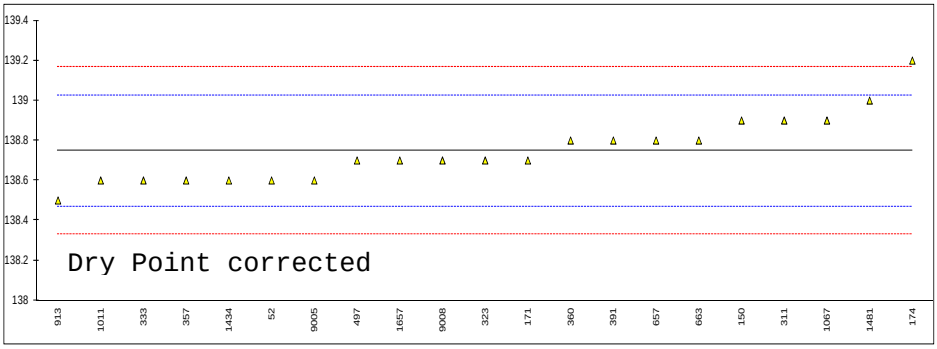


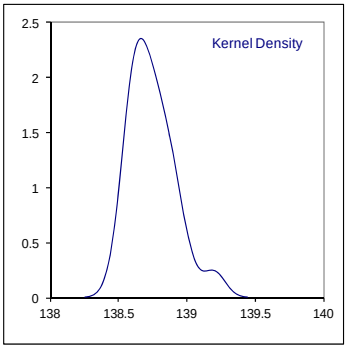
Determination of Dry Point on sample #12102; results in °C

lab	method	value	mark	z(targ)	value after manual correction	z(targ)	remarks
52	D850-A	138.6		-0.89	138.6	-1.06	
150	D850-A	138.9		1.27	138.9	1.09	
158		-----		-----	-----	-----	
171	D850-A	139.0		1.98	138.7	-0.34	
174	D850-A	139.0		1.98	139.2	3.25	
311	D850-A	138.9		1.27	138.9	1.09	
323	D850-M	138.5		-1.61	138.7	-0.34	
333	D850-A	138.9		1.27	138.6	-1.06	
357	D850-A	138.6		-0.89	138.6	-1.06	
360	D850-A	138.8		0.55	138.8	0.38	
391	D850-M	138.8		0.55	138.8	0.38	
444		-----		-----	-----	-----	
497	D850-A	138.5		-1.61	138.7	-0.34	
551		-----		-----	-----	-----	
657	D850-M	138.8		0.55	138.8	0.38	
663	D850-A	138.8		0.55	138.8	0.38	
913	D850-M	138.5		-1.61	138.5	-1.78	
1011	D850-A	138.6		-0.89	138.6	-1.06	
1041		-----		-----	-----	-----	
1067	D850-M	138.9		1.27	138.9	1.09	
1081		-----		-----	-----	-----	
1434	D850-A	138.6		-0.89	138.6	-1.06	
1481	D850-M	139.0		1.98	139.0	1.81	
1538		-----		-----	-----	-----	
1657	D850-A	138.2		-3.76	138.7	-0.34	
1852		-----		-----	-----	-----	
1866	D850-	-----		-----	-----	-----	
7001		-----		-----	-----	-----	
9005	D850-A	138.6		-0.89	138.6	-1.06	
9008	D850-	138.7		-0.17	138.7	-0.34	
	normality	OK			OK		
	n	21			21		
	outliers	0			0		
	mean (n)	138.72			138.75		
	st.dev. (n)	0.210			0.166		
	R(calc.)	0.59			0.46		
	R(D850:11)	0.39			0.39		



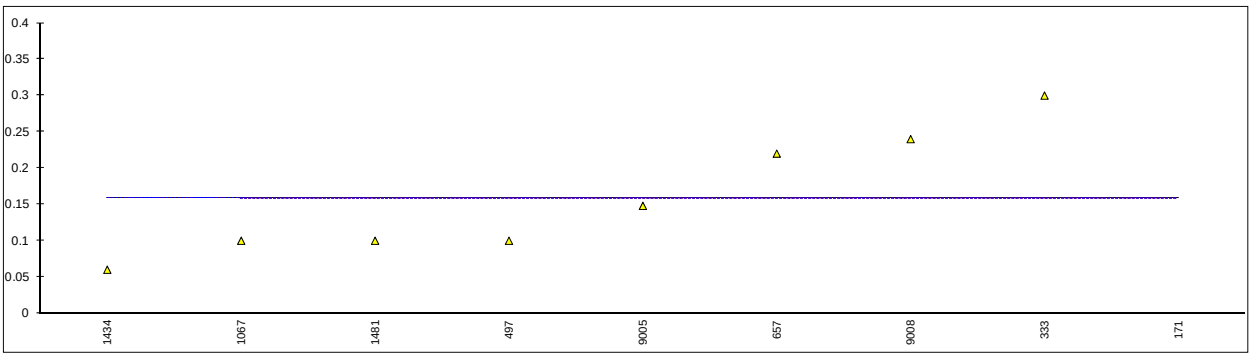






Determination of Organic Chloride in p-Xylene sample #12102; results in mg/kg.

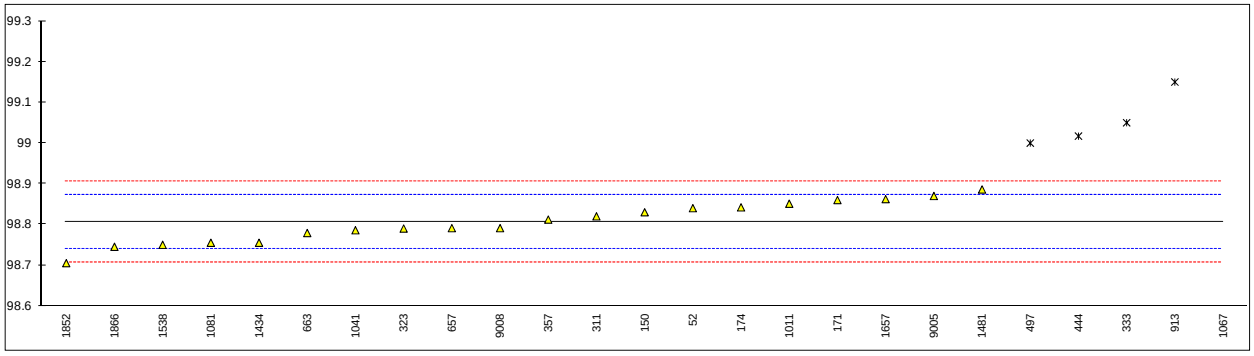
lab	method	value	mark	z(targ)	Remarks
52		-----		-----	
150	D7359	<0.5		-----	
158		-----		-----	
171	UOP779	2.5	G(0.01)	-----	
174		-----		-----	
311	UOP779	<1		-----	
323	UOP779	<1		-----	
333	UOP779	0.3		-----	
357	UOP779	<1		-----	
360		-----		-----	
391		-----		-----	
444		-----		-----	
497	UOP779	0.1		-----	
551		-----		-----	
657	UOP779	0.22		-----	
663		-----		-----	
913		-----		-----	
1011		-----		-----	
1041		-----		-----	
1067	UOP779	0.1		-----	
1081	UOP779	<0.5		-----	
1434	D7536	0.06		-----	
1481	UOP779	0.1		-----	
1538		-----		-----	
1657		-----		-----	
1852	DIN14077	<1		-----	
1866		-----		-----	
7001		-----		-----	
9005	D5808	0.148		-----	
9008	D5808	0.24		-----	
	normality	OK	OK		
	n	14	8		
	outliers	1	1		
	mean (n)	<1	<0.3		
	st.dev. (n)	n.a	n.a		
	R(calc.)	n.a	n.a		
	R(UOP779:08)	n.a	n.a		application range: 0.3 – 1000 mg/kg

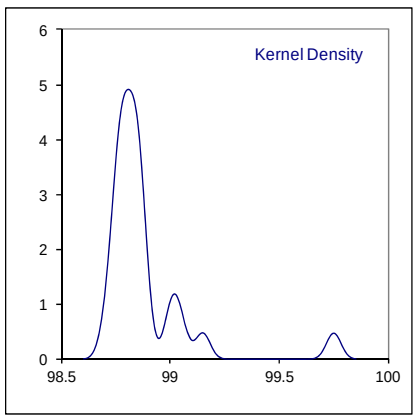


Determination of Purity of p-Xylene sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52	D5917	98.84		1.03	
150	D3798	98.83		0.73	
158		-----		-----	
171	D7504	98.86		1.64	
174	D7504	98.842		1.09	
311	D3798	98.82		0.42	
323	D5917	98.79		-0.49	
333	D3798	99.05	DG(0.05)	7.40	
357	D3798	98.812		0.18	
360		-----		-----	
391		-----		-----	
444	D5917	99.017	DG(0.05)	6.40	
497	D3798	99.000	C,G(0.05)	5.88	first reported: 98.967
551		-----		-----	
657	D5917	98.7910		-0.45	
663	D7504	98.779		-0.82	
913	D3798	99.15	G(0.05)	10.43	
1011	D5917	98.851	C	1.36	first reported: 98.865
1041	in house	98.7858		-0.61	
1067	D3798	99.75	G(0.01)	28.62	
1081	D3798	98.755		-1.55	
1434	D3798	98.755		-1.55	
1481	D3798	98.886		2.43	
1538	D7504	98.75		-1.70	
1657	D5917	98.8623		1.71	
1852	DIN51437	98.7049		-3.07	
1866	UOP720	98.7452		-1.84	
7001		-----		-----	
9005	D3798	98.870		1.94	
9008	UOP720	98.791		-0.45	

normality	OK
n	20
outliers	5
mean (n)	98.8060
st.dev. (n)	0.04919
R(calc.)	0.1377
R(D3798:03)	0.0923

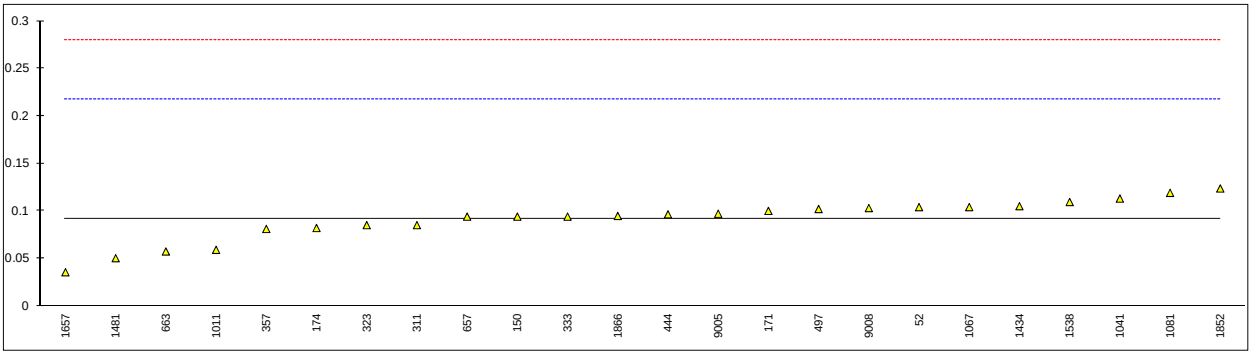


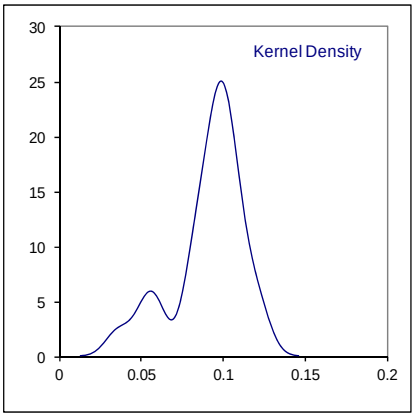


Determination of Nonaromatics in p-Xylene sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52	D5917	0.104		0.20	
150	D3798	0.094		0.05	
158		-----		-----	
171	D7504	0.10		0.14	
174	D7504	0.082	C	-0.15	first reported: 0.062
311	D3798	0.085		-0.10	
323	D5917	0.085		-0.10	
333	D3798	0.094		0.05	
357	D3798	0.081		-0.16	
360		-----		-----	
391		-----		-----	
444	D5917	0.0964		0.08	
497	D3798	0.102		0.17	
551		-----		-----	
657	D5917	0.0940		0.05	
663	D7504	0.0573		-0.54	
913		-----		-----	
1011	D5917	0.059	C	-0.51	first reported: 0.053
1041	in house	0.1130		0.35	
1067	D3798	0.104		0.20	
1081	D3798	0.119		0.44	
1434	D3798	0.105		0.22	
1481	D3798	0.0502		-0.65	
1538	D7504	0.1094		0.29	
1657	D5917	0.0354		-0.89	
1852	DIN51437	0.1236		0.52	
1866	UOP720	0.0947		0.06	
7001		-----		-----	
9005	D3798	0.097		0.09	
9008	UOP720	0.1030		0.19	

normality	not OK
n	24
outliers	0
mean (n)	0.0912
st.dev. (n)	0.02169
R(calc.)	0.0607
R(D3798:03)	0.1763

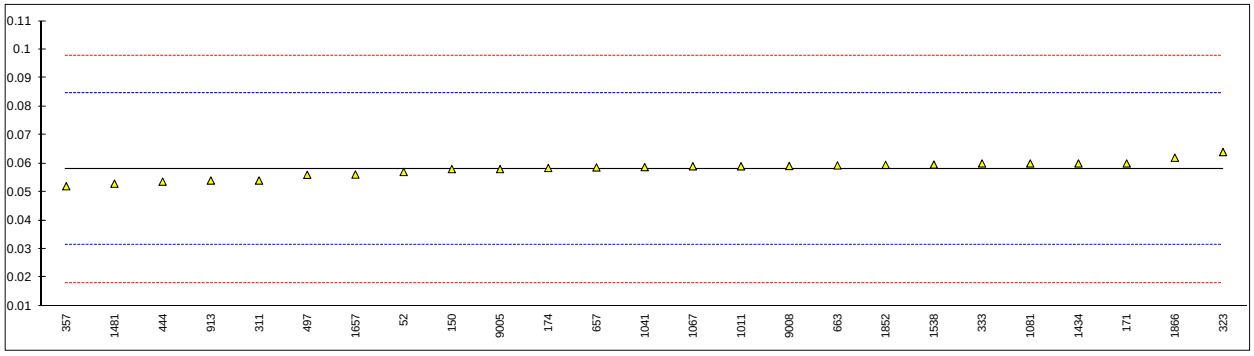


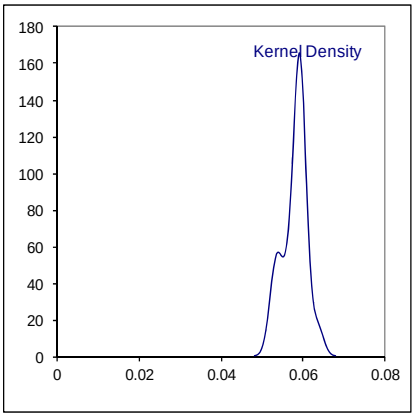


Determination of Toluene in p-Xylene sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52	D5917	0.057		-0.07	
150	D3798	0.058		0.00	
158		-----		-----	
171	D7504	0.06		0.15	
174	D7504	0.0584		0.03	
311	D3798	0.054		-0.30	
323	D5917	0.064		0.45	
333	D3798	0.060		0.15	
357	D3798	0.052		-0.45	
360		-----		-----	
391		-----		-----	
444	D5917	0.0536		-0.33	
497	D3798	0.056		-0.15	
551		-----		-----	
657	D5917	0.0586		0.05	
663	D7504	0.0593		0.10	
913	D3798	0.054		-0.30	
1011	D5917	0.059		0.08	
1041	in house	0.0587		0.06	
1067	D3798	0.059		0.08	
1081	D3798	0.06		0.15	
1434	D3798	0.06		0.15	
1481	D3798	0.0529		-0.38	
1538	D7504	0.0596		0.12	
1657	D5917	0.0561		-0.14	
1852	DIN51437	0.0595		0.12	
1866	UOP720	0.0620		0.30	
7001		-----		-----	
9005	D3798	0.058		0.00	
9008	UOP720	0.0591		0.09	

normality	not OK
n	25
outliers	0
mean (n)	0.0578
st.dev. (n)	0.00289
R(calc.)	0.0081
R(D3798:03)	0.0373

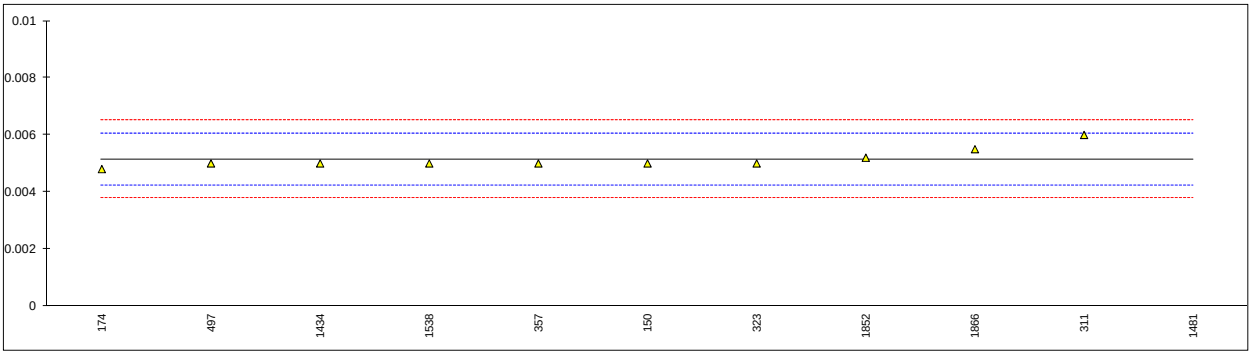


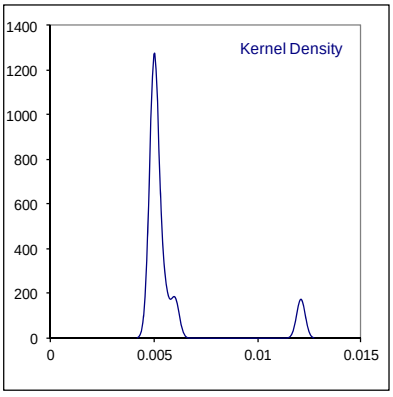


Determination of Styrene in p-Xylene sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52		-----		-----	
150	D3798	0.005		-0.33	
158		-----		-----	
171	D7504	<0.01		-----	
174	D7504	0.0048		-0.77	
311	D3798	0.006		1.87	
323	D5917	0.005		-0.33	
333		-----		-----	
357		0.005		-0.33	
360		-----		-----	
391		-----		-----	
444		-----		-----	
497		0.005		-0.33	
551		-----		-----	
657		-----		-----	
663		-----		-----	
913		-----		-----	
1011		-----	W	-----	result withdrawn
1041	in house	<0.01		-----	
1067	D3798	<0.001		<-8.29	false negative result?
1081		-----		-----	
1434		0.005		-0.33	
1481		0.0121	G(0.01)	15.27	
1538	D7504	0.0050		-0.33	
1657		-----		-----	
1852	DIN51437	0.0052		0.11	
1866	UOP720	0.0055		0.77	
7001		-----		-----	
9005		-----		-----	
9008		-----		-----	

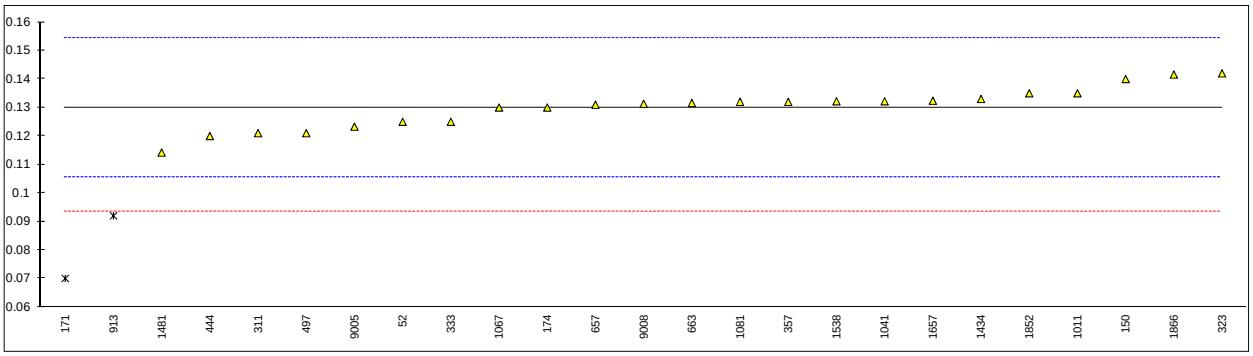
normality	not OK
n	10
outliers	1
mean (n)	0.0051
st.dev. (n)	0.00035
R(calc.)	0.0010
R(Horwitz)	0.0013

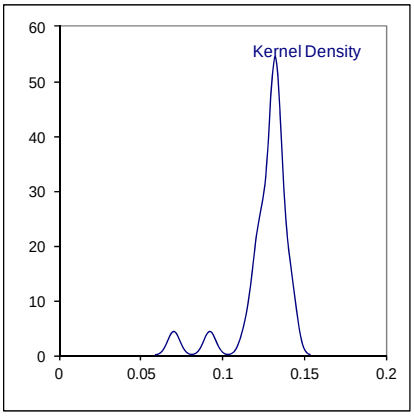




Determination of Ethylbenzene in p-Xylene sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52	D5917	0.125		-0.41	
150	D3798	0.140		0.81	
158		-----		-----	
171	D7504	0.07	G(0.01)	-4.90	
174	D7504	0.130		0.00	
311	D3798	0.121		-0.74	
323	D5917	0.142		0.98	
333	D3798	0.125		-0.41	
357	D3798	0.132		0.16	
360		-----		-----	
391		-----		-----	
444	D5917	0.1200		-0.82	
497	D3798	0.121		-0.74	
551		-----		-----	
657	D5917	0.1310		0.08	
663	D7504	0.1316		0.13	
913	D3798	0.092	G(0.01)	-3.11	
1011	D5917	0.135		0.41	
1041	in house	0.1322		0.18	
1067	D3798	0.130		0.00	
1081	D3798	0.132		0.16	
1434	D3798	0.133		0.24	
1481	D3798	0.1142		-1.29	
1538	D7504	0.1322		0.18	
1657	D5917	0.1324		0.19	
1852	DIN51437	0.1350		0.41	
1866	UOP720	0.1416		0.94	
7001		-----		-----	
9005	D3798	0.1233		-0.55	
9008	UOP720	0.1313		0.10	
	normality	not OK			
	n	23			
	outliers	2			
	mean (n)	0.1300			
	st.dev. (n)	0.00698			
	R(calc.)	0.0196			
	R(D3798:03)	0.0343			

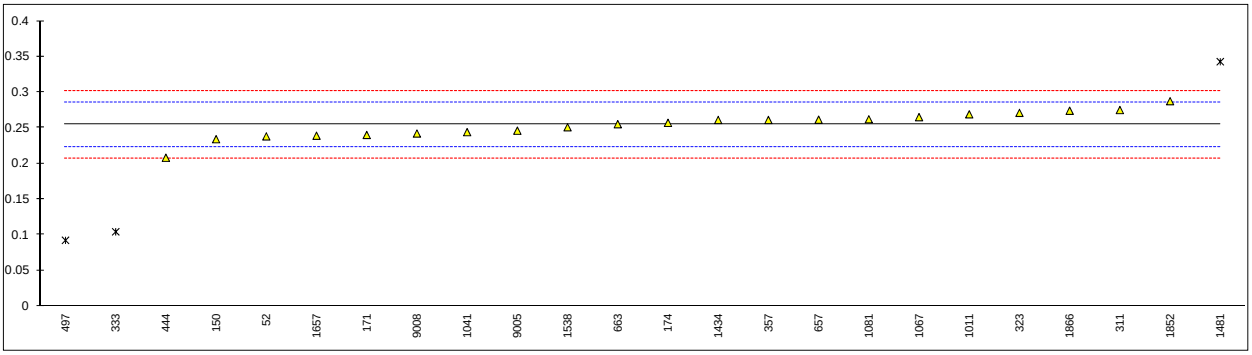


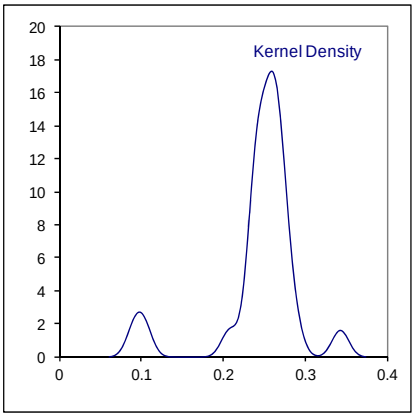


Determination of m-Xylene in sample #12102; results in %M/M.

lab	method	value	mark	z(targ)	Remarks
52	D5917	0.238		-1.04	
150	D3798	0.234		-1.30	
158		-----		-----	
171	D7504	0.24		-0.92	
174	D7504	0.257		0.17	
311	D3798	0.275		1.32	
323	D5917	0.271		1.07	
333	D3798	0.104	G(0.01)	-9.62	
357	D3798	0.261		0.43	
360		-----		-----	
391		-----		-----	
444	D5917	0.2080		-2.96	
497	D3798	0.092	C,G(0.05)	-10.39	first reported: 0.131
551		-----		-----	
657	D5917	0.2614		0.45	
663	D7504	0.2551		0.05	
913		-----		-----	
1011	D5917	0.269		0.94	
1041	in house	0.2439		-0.67	
1067	D3798	0.265		0.68	
1081	D3798	0.262		0.49	
1434	D3798	0.261		0.43	
1481	D3798	0.3428	G(0.01)	5.66	
1538	D7504	0.2508		-0.22	
1657	D5917	0.2389		-0.99	
1852	DIN51437	0.2874		2.12	
1866	UOP720	0.2740		1.26	
7001		-----		-----	
9005	D3798	0.246		-0.53	
9008	UOP720	0.2420		-0.79	

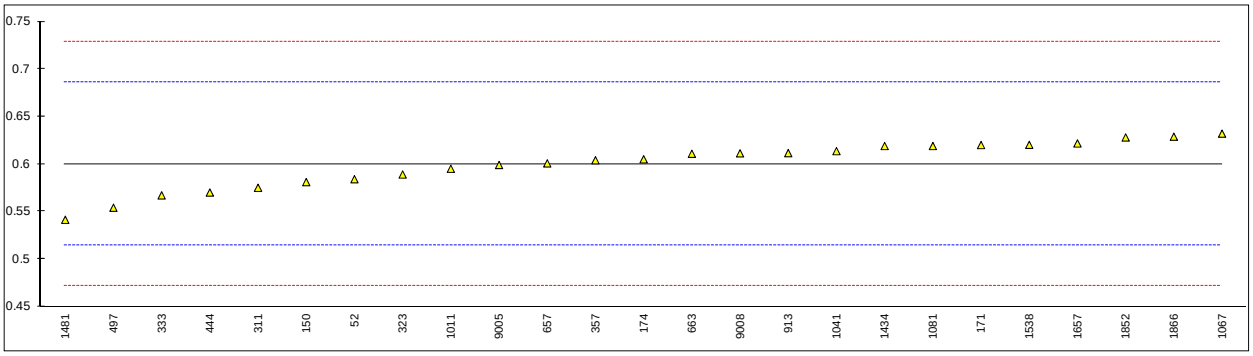
normality	OK
n	21
outliers	3
mean (n)	0.2543
st.dev. (n)	0.01779
R(calc.)	0.0498
R(D3798:03)	0.0437

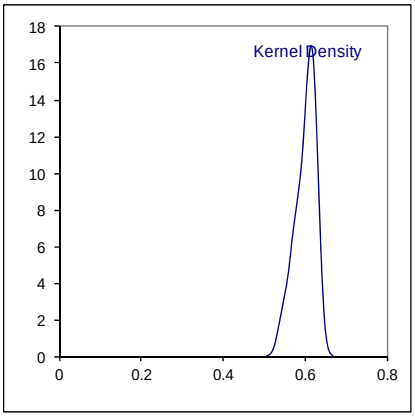




Determination of o-Xylene sample #12102; results in %M/M.

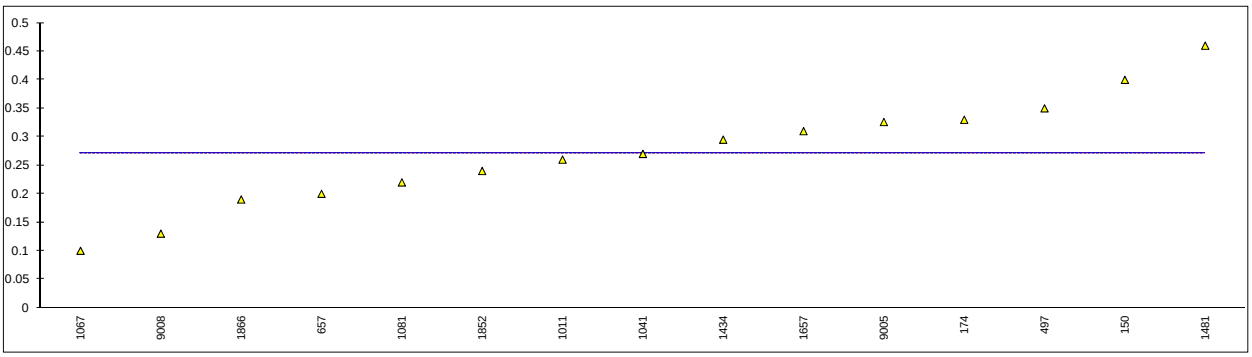
lab	method	value	mark	z(targ)	Remarks
52	D5917	0.584		-0.37	
150	D3798	0.581		-0.44	
158		-----		-----	
171	D7504	0.62		0.47	
174	D7504	0.605		0.12	
311	D3798	0.575		-0.58	
323	D5917	0.589	C	-0.26	first reported: 0.645
333	D3798	0.567		-0.77	
357	D3798	0.604		0.09	
360		-----		-----	
391		-----		-----	
444	D5917	0.5700		-0.70	
497	D3798	0.554		-1.07	
551		-----		-----	
657	D5917	0.6007		0.02	
663	D7504	0.6108		0.25	
913	D3798	0.6115		0.27	
1011	D5917	0.595		-0.12	
1041	in house	0.6136		0.32	
1067	D3798	0.632		0.75	
1081	D3798	0.619		0.44	
1434	D3798	0.619		0.44	
1481	D3798	0.5413		-1.37	
1538	D7504	0.6202		0.47	
1657	D5917	0.6217		0.51	
1852	DIN51437	0.6280		0.65	
1866	UOP720	0.6288		0.67	
7001		-----		-----	
9005	D3798	0.599		-0.02	
9008	UOP720	0.6113		0.26	
	normality	OK			
	n	25			
	outliers	0			
	mean (n)	0.6000			
	st.dev. (n)	0.02431			
	R(calc.)	0.0681			
	R(D3798:03)	0.1200			

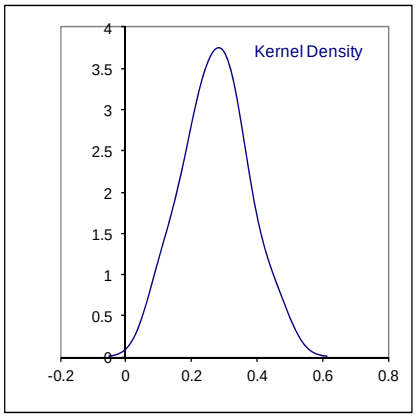




Determination of Sulphur in p-Xylene sample #12102; results in mg/kg.

lab	method	value	mark	z(targ)	Remarks
52	D7183	<0.5		-----	
150	D5453	0.4		-----	
158		-----		-----	
171	D7183	<0.5		-----	
174	D7183	0.33		-----	
311	D7183	<0.50		-----	
323	D5453	<1.0		-----	
333	D5453	<1		-----	
357	D7183	<0.5		-----	
360	D5453	<1.0		-----	
391		-----		-----	
444		-----		-----	
497	D7183	0.35		-----	
551		-----		-----	
657	D5453	0.20		-----	
663	D5453	<1.0		-----	
913		-----		-----	
1011	ISO20846	0.26	C	-----	first reported: 0.54
1041	D5453	0.27		-----	
1067	D7183	0.1		-----	
1081	D7183	0.22		-----	
1434	D7183	0.295		-----	
1481	D7183	0.46		-----	
1538		-----		-----	
1657	D5453	0.310		-----	
1852	DIN51437	0.24		-----	
1866	D7183	0.19		-----	
7001		-----		-----	
9005	D5453	0.326		-----	
9008	D5453	0.13		-----	
	normality	OK			
	n	15			
	outliers	0			
	mean (n)	0.27			
	st.dev. (n)	0.100			
	R(calc.)	0.27			
	R(D5453:09)	(0.22)			Application range: 1 – 8000 mg/kg





APPENDIX 2

List of number of participants per country

1 lab in	BELGIUM
1 lab in	BRAZIL
1 lab in	BULGARIA
1 lab in	CANADA
1 lab in	FINLAND
1 lab in	FRANCE
3 labs in	GERMANY
1 lab in	INDIA
1 lab in	IRAN
1 lab in	ISRAEL
1 lab in	ITALY
2 labs in	KUWAIT
1 lab in	MALAYSIA
1 lab in	POLAND
1 lab in	PORTUGAL
1 lab in	SAUDI ARABIA
1 lab in	SINGAPORE
1 lab in	THAILAND
4 labs in	THE NETHERLANDS
4 labs in	U.S.A.
1 lab in	UNITED KINGDOM

APPENDIX 3

Abbreviations:

C	= final result after checking of first reported suspect 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
E	= error in calculations
ex	= excluded from calculations
n.a.	= not applicable
SDS	= Safety Data Sheet

Literature:

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, January 2010

2 ASTM E178-02

3 ASTM E1301-03

4 ISO 5725-86

5 ISO 5725, parts 1-6, 1994

6 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)

7 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)

8 IP 367/84

9 DIN 38402 T41/42

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

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

12 Analytical Methods Committee Technical brief, No4 January 2001.

13 The Royal Society of Chemistry 2002, Analyst 2002, 127 page 1359-1364, P.J. Lowthian and M. Thompson (see http://www.rsc.org/suppdata/an/b2/b205600n/).