

Results of Proficiency Test
ortho- and para-Xylenes
October 2014

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

Author: ing. R.J. Starink
Correctors: dr. R.G. Visser & ing. L. Sweere
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1 INTRODUCTION

Since 1995, the Institute for Interlaboratory Studies organizes a proficiency test for the analyses of o- and p-Xylenes once every two years. As part of the annual proficiency test program of 2014/2015, it was decided to continue this proficiency test on o- and p-Xylenes. In this interlaboratory study, 35 laboratories from 20 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. This report is also electronically available through the iis internet site www.iisnl.com.

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 0.5 L bottle with p-Xylene (labelled #14191) and one 0.25 L bottle with o-Xylene (labelled #14192). 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 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This proficiency test 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 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 April 2014 (iis-protocol, version 3.3).

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. 46 litre p-Xylene, purchased from a Dutch chemicals supplier, was enriched with 8370 mg Toluene, 7390 mg Styrene, 49.1 mg Chloroform and 468.1 mg Dibenzothiophene. After homogenisation, 60 brown glass bottles of 0.50L with inner and outer caps were filled and labelled #14191. The homogeneity of the subsamples was checked by determination of Density @ 20°C in accordance with ASTM D4052:02e1 and Ethylbenzene in accordance with ASTM D3798:03 on 8 stratified randomly selected samples.

	<i>Density @15°C in kg/L</i>	<i>Ethylbenzene in %M/M</i>
sample #14191-1	0.86103	0.120
sample #14191-2	0.86102	0.119
sample #14191-3	0.86102	0.120
sample #14191-4	0.86102	0.121
sample #14191-5	0.86102	0.117
sample #14191-6	0.86102	0.120
sample #14191-7	0.86103	0.120
sample #14191-8	0.86103	0.120

Table 1: homogeneity test results of subsamples #14191 (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:

	<i>Density @20°C in kg/L</i>	<i>Ethylbenzene in %M/M</i>
r (measured)	0.00001	0.003
Reference method	ASTM D4052:02e1	ASTM D3798:03
0.3* R (reference method)	0.00015	0.009

Table 2: repeatabilities on subsamples #14191

The second batch, approx. 15 litre o-Xylene, purchased from a Dutch chemicals supplier, was enriched with 1550 mg Styrene and 3600 mg Ethylbenzene. After homogenisation, 60 brown glass bottles of 0.25L with inner and outer caps, were filled and labelled #14192. The homogeneity of the subsamples #14192 was checked by determination of Density @20°C in accordance with ASTM D4052:02e1 and p-Xylene in accordance with ASTM D 3797:05 on 8 stratified randomly selected samples.

	<i>Density @20°C in kg/L</i>	<i>p-Xylene in %M/M</i>
sample #14192-1	0.87937	0.068
sample #14192-2	0.87937	0.068
sample #14192-3	0.87937	0.066
sample #14192-4	0.87937	0.66
sample #14192-5	0.87938	0.069
sample #14192-6	0.87937	0.064
sample #14192-7	0.87937	0.066
sample #14192-8	0.87937	0.065

Table 3: homogeneity test results of subsamples #14192 (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:

	<i>Density @20°C in kg/L</i>	<i>p-Xylene in %M/M</i>
r (measured)	0.00001	0.005
Reference method	ASTM D4052:02e1	ASTM D3797:05
0.3* R (reference method)	0.00015	0.007

Table 4: repeatabilities on subsamples #14192

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 0.5 L with p-Xylene (labelled #14191) and 1 bottle of 0.25 L with o-Xylene (labelled #14192) were sent on September 24, 2014.

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 #14191 (p-Xylene) was requested to determine: Appearance, Colour Pt/Co, Density at 20°C, 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). On sample #14192 (o-Xylene): Purity and Impurities (m- and p-Xylene, Ethylbenzene, Styrene, Sum of Ethyltoluenes, n-Propylbenzene, iso-Propylbenzene (Cumene), Toluene and Non aromatics.

To get comparable results a detailed report form, on which the units were prescribed as well as the required standards and a letter of instructions were prepared and made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The detailed report form was also 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 received. The original reported results were tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after deadline, a reminder fax was sent to those laboratories that had not yet reported results. 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 were used for data analysis and original results were 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' (iis-protocol, April 2014 version 3.3). 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 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. Not all data sets proved to have a normal distribution, in which cases the statistical evaluation of the results should be used with due care.

In accordance to ISO 5725 (1986 and 1994) the original results per determination were submitted subsequently to Dixon, Grubbs and Rosner outlier tests. Outliers are marked by D(0.01) for the Dixon test, by G(0.01) or DG(0.01) for the Grubbs test and by R(0.01) for the Rosner General ESD test (see appendix 3, no.15). Stragglers are marked by D(0.05) for the Dixon 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 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 them 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.13 and 14). Also a normal Gauss curve was projected over the Kernel Density Graph.

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 spread of this interlaboratory study. The 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 whether the reported test result is fit-for-use.

The z-scores were calculated in accordance with:

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

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

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

$ z < 1$	good
$1 < z < 2$	satisfactory
$2 < z < 3$	questionable
$ z > 3$	unsatisfactory

4 EVALUATION

In this proficiency test problems were encountered with the despatch of the samples to laboratories in Brazil, Israel, Kuwait and Turkey. Due to custom clearance problems, a number of laboratories did receive the samples late.

Six participants did not report any test results and nine participants did report test results after the final reporting date. Finally, 29 participants did report in total 529 numerical test results.

Observed were 29 outlying test results, which is 5.5%. 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.

Several test methods for the determination of impurities in ortho-Xylene and para-Xylene are available, like ASTM D7504 and ASTM D5917 and the withdrawn methods ASTM D3797 and ASTM D3798. However, in both test methods only repeatabilities are mentioned, which are extremely strict. Therefore, it was decided to continue with the precision data mentioned in both withdrawn test methods ASTM D3797 and ASTM D3798. In case no precision data was mentioned, the observed spread was compared against the spread estimated from the Horwitz equation.

In the iis PT reports, ASTM methods are referred to with a number (e.g. D2086) and an added designation for the year that the method was adopted or revised (e.g. D2086-08). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D2086-08 (2013)). In the results tables of Appendix 1 only the method number and year of adoption or revision will be used.

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.

Sample #14191 p-Xylene:

Appearance: All participants agreed about the appearance of sample #14191. Participants who used the ASTM E2680 should report the Appearance as ‘pass’ (or ‘fail’). Nine participants reported the appearance correctly as pass. The other laboratories used different kind of terms or

abbreviations like: Clear, C&B and CFFSM. The explanations for the used abbreviations are given on page 14.

- Colour Pt/Co: This determination was not problematic. One statistical outlier was observed and the calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5386:10 and ASTM D1209:11.
- Density: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4052:02e1.
The current version of the test method ASTM D4052:11 is valid for gasolines, distillates, basestocks and lubricating oils. Therefore this 2011 version may not be applicable for p-Xylene.
- Distillation: This determination was not problematic. In total five statistical outliers were observed. The calculated reproducibilities of IBP, 50% rec and DP are in agreement with the requirements of ASTM D850:11.
- Organic chloride: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in agreement with the requirements of ASTM D5808:09a. The average recovery of Organic Chloride (theoretical increment of 1.08 mg/kg) may be good: "less than 94%". The actual blank concentration for Organic Chloride is unknown.
- Sulphur: This determination may not be problematic. No statistical outliers were observed and the calculated reproducibility is almost in agreement with the requirements of ASTM D5453:12. The average recovery of Sulphur (theoretical increment of 2.02 mg/kg) may be good: "less than 95%". The actual blank concentration for Sulphur is unknown.
- Purity: This determination was problematic for a number of laboratories. Three statistical outliers were observed. However, the calculated reproducibility, after rejection of the statistical outliers, is in full agreement with the requirements of ASTM D3798:03.
- 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 requirements of ASTM D3798:03.
- m-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 requirements of ASTM D3798:03.

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

Styrene: This determination was not problematic. Two statistical outliers and one false negative test result were observed. The calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements estimated from the Horwitz equation. The average recovery of Styrene (theoretical increment of 0.0161 %M/M) may be excellent: "less than 101%". The actual blank concentration for Styrene is unknown.

Toluene: This determination was not problematic. Only one statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D3798:03. The average recovery of Toluene (theoretical increment of 0.0182 %M/M) may be good: "less than 123%". The actual blank concentration for Toluene is unknown.

Nonaromatics: This determination was not problematic. Only one statistical outlier was observed and the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D3798:03.

Sample #14192 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.

m-Xylene: This determination was not problematic. Only 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.

p-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.

Ethylbenzene: This determination was not problematic. Only 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. The average recovery of Ethylbenzene (theoretical

increment of 0.0229 %M/M) may be excellent: "less than 104%". The actual blank concentration for Ethylbenzene is unknown.

n-Propylbenzene: This determination may be problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the strict requirements estimated using the Horwitz equation.

iso-Propylbenzene: 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 not problematic. Only one statistical outlier and one false negative result were observed. The calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D3797:05. The average recovery of Styrene (theoretical increment of 0.0100 %M/M) may be good: "less than 91%". The actual blank concentration for Styrene is unknown.

Sum of Ethyltoluenes: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the strict requirements estimated using the Horwitz equation.

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

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.

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 _t	R(lit)
Appearance	---	21	Pass	n.a.	n.a.
Colour Pt/Co	---	21	5.3	3.5	5.4
Density @ 20°C	kg/L	24	0.8610	0.0004	0.0005
Initial Boiling Point	°C	19	137.8	0.5	1.0
50% Boiling Point	°C	20	138.3	0.1	0.4
Dry Point	°C	21	138.4	0.3	0.4
Organic Chloride	mg/kg	17	1.01	0.61	1.30
Sulphur	mg/kg	25	1.89	1.03	0.94
p-Xylene	%M/M	24	99.401	0.074	0.093
o-Xylene	%M/M	24	0.160	0.021	0.032
m-Xylene	%M/M	22	0.257	0.039	0.044
Ethylbenzene	%M/M	24	0.124	0.023	0.033
Styrene	%M/M	12	0.016	0.001	0.003
Toluene	%M/M	25	0.022	0.004	0.014
Non-aromatics	%M/M	23	0.019	0.012	0.038

Table 5: reproducibilities for sample (p-Xylene) #14191

Parameter	unit	n	average	2.8 *sd _R	R (lit)
o-Xylene	%M/M	25	99.071	0.245	0.423
m-Xylene	%M/M	24	0.235	0.036	0.057
p-Xylene	%M/M	25	0.071	0.015	0.024
Ethylbenzene	%M/M	24	0.024	0.006	0.011
n-Propylbenzene	%M/M	11	0.012	0.003	0.003
i-Propylbenzene	%M/M	19	0.023	0.004	0.006
Styrene	%M/M	17	0.009	0.003	0.004
Sum of Ethyltoluenes	%M/M	10	0.132	0.026	0.028
Toluene	%M/M	22	0.004	0.001	0.001
Non-aromatics	%M/M	22	0.422	0.115	0.312

Table 6: reproducibilities for sample (o-Xylene) #14192

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 OCTOBER 2014 PROFICIENCY TEST WITH PREVIOUS PT RESULTS

	October 2014	September 2012	October 2010	November 2008
Number of reporting labs	29	27	26	26
Number of results reported	529	471	471	502
Statistical outliers	29	27	41	33
Percentage outliers	5.5%	5.7%	8.7%	6.6%

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	October 2014	September 2012	October 2010	November 2008
Colour Pt/Co	++	+	--	++
Density @ 20°C	++	++	++	++
Initial Boiling Point	++	+	++	++
50% Boiling Point	++	+/-	+/-	n.e.
Dry Point	++	-	++	-
Organic chloride	++	n.e	n.e.	n.e.
Sulphur	+/-	n.e.	(--)	n.e.
p-Xylene	++	-	++	++
o-Xylene	++	++	++	++
m-Xylene	+	-	--	+/-
Ethylbenzene	++	++	++	++
Styrene *)	++	-	n.e.	++
Toluene	++	++	++	++
Non-aromatics	++	++	++	++

Table 8: comparison determinations of sample #14191 (p-xylene) against the standard methods

Determination	October 2014	September 2012	October 2010	November 2008
o-Xylene	++	+	++	++
m-Xylene	++	++	++	+/-
p-Xylene	++	++	++	++
Ethylbenzene	++	++	++	++
n-Propylbenzene *)	+/-	++	-	+/-
i-Propylbenzene	+	++	++	-
Styrene	+	++	++	++
Sum of Ethyltoluenes *)	+	+/-	-	++
Toluene	+/-	++	++	++
Non-aromatics	++	++	++	++

Table 9: comparison determinations of sample #14192 (o-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 Appearance on p-Xylene sample #14191;**

lab	method	value	mark	z(targ)	remarks
52	E2680	Pass		----	
150	E2680	Pass		----	
158	D4176	C&B		----	
171	E2680	Pass		----	
174	E2680	Pass		----	
311	E2680	Pass		----	
323	E2680	CFFSM		----	
333	Visual	C&B		----	
357	E2680	Pass		----	
391		----		----	
444		----		----	
445	E2680	Pass		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	E2680	C&B		----	
913	E2680	CFFSM		----	
1011	Visual	C&B		----	
1041		----		----	
1067		----		----	
1081	in house	C&B		----	
1107		----		----	
1161		----		----	
1201	E2680	Pass		----	
1291		----		----	
1351		----		----	
1434	Visual	Clear		----	
1538		----		----	
1657	Visual	Clear		----	
1852		----		----	
1866	E2680	Clear		----	
1880	D4176	Pass		----	
1908	E2680	C&B		----	
9008	E2680	Clear		----	
	n	21			
	mean (n)	Pass			

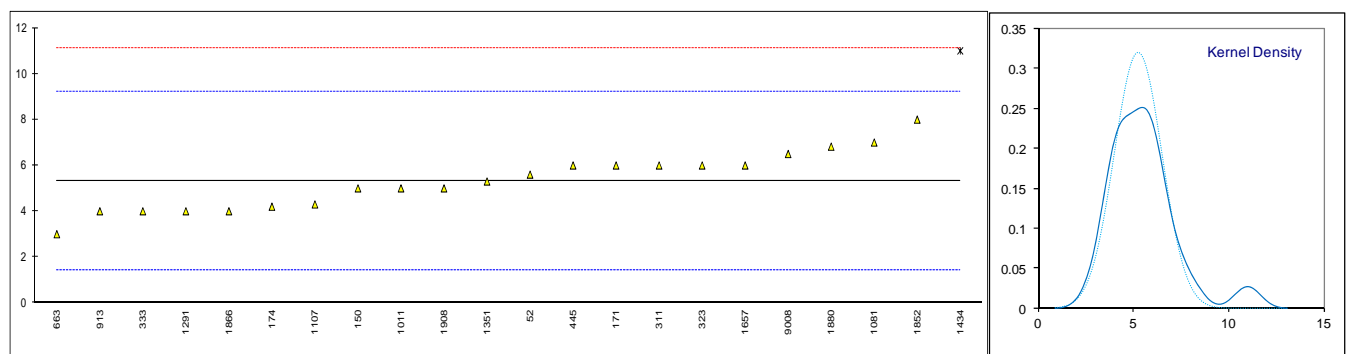
C&B = Clear and Bright

CFFSM = Clear and Free From Suspended Matter

Determination of Colour Pt/Co on p-Xylene sample #14191;

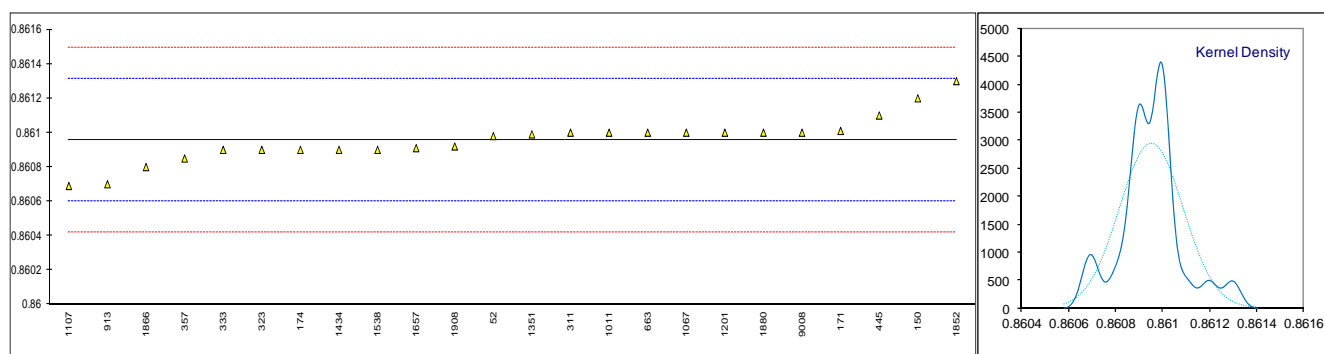
lab	method	value	mark	z(targ)	remarks
52	D5386	5.6		0.14	
150	D5386	5		-0.17	
158	D1209	<2		----	
171	D5386	6		0.35	
174	D5386	4.2		-0.58	
311	D5386	6		0.35	
323	D5386	6		0.35	
333	D5386	4		-0.68	
357	D1209	< 5		----	
391		----		----	
444		----		----	
445	D1209	6		0.35	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D5386	3		-1.20	
913	D5386	4		-0.68	
1011	D1209	5		-0.17	
1041		----		----	
1067	D5386	<5		----	
1081	D5386	7		0.87	
1107	D5386	4.3		-0.53	
1161		----		----	
1201	D5386	<5		----	
1291	D1209	4		-0.68	
1351	D1209	5.3		-0.01	
1434	D1209	11	R(0.01)	2.93	
1538		----		----	
1657	D1209	6		0.35	
1852	ISO6271	8		1.38	
1866	D5386	4		-0.68	
1880	D5386	6.82		0.77	
1908	D1209	5		-0.17	
9008	D5386	6.5		0.61	
normality		OK			
n		21			
outliers		1			
mean (n)		5.3			
st.dev. (n)		1.24			
R(calc.)		3.5			
R(D5386:10)		5.4			

Compare R(D1209) = 7.0



Determination of Density @ 20°C on p-Xylene sample #14191; results in kg/L.

lab	method	value	mark	z(targ)	remarks
52	D4052	0.86098	C	0.13	Reported 860.98, probably unit error
150	D4052	0.8612		1.37	
158		-----		-----	
171	D4052	0.86101		0.30	
174	D4052	0.8609		-0.31	
311	D4052	0.8610		0.25	
323	D4052	0.8609		-0.31	
333	D4052	0.8609		-0.31	
357	D4052	0.86085		-0.59	
391		-----		-----	
444		-----		-----	
445	D4052	0.8611		0.81	
551		-----		-----	
555		-----		-----	
557		-----		-----	
558		-----		-----	
663	D4052	0.8610		0.25	
913	D4052	0.8607		-1.43	
1011	D4052	0.8610		0.25	
1041		-----		-----	
1067	D4052	0.8610		0.25	
1081		-----		-----	
1107	D4052	0.86069		-1.49	
1161		-----		-----	
1201	ISO12185	0.8610		0.25	
1291		-----		-----	
1351	D4052	0.86099		0.19	
1434	D4052	0.8609		-0.31	
1538	D4052	0.8609		-0.31	
1657	D4052	0.86091	C	-0.26	First reported 0.8641
1852	ISO3675	0.8613		1.93	
1866	D4052	0.8608		-0.87	
1880	D4052	0.86100		0.25	
1908	D4052	0.86092	C	-0.20	First reported 0.86591
9008		-----		0.25	
normality		suspect			
n		24			
outliers		0			
mean (n)		0.86096			
st.dev. (n)		0.000133			
R(calc.)		0.00037			
R(D4052:02e1)		0.00050			

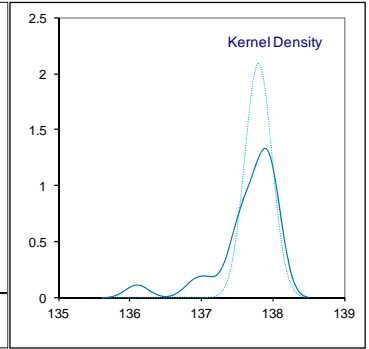
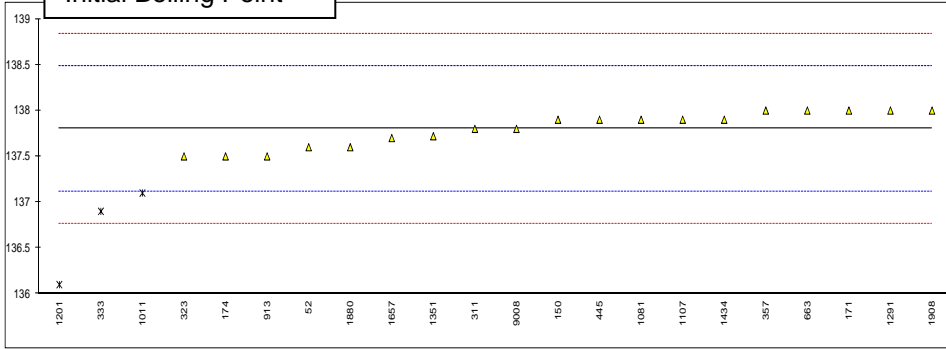


Determination of Distillation on sample #14191; results in °C

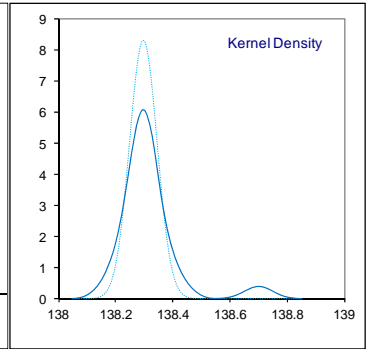
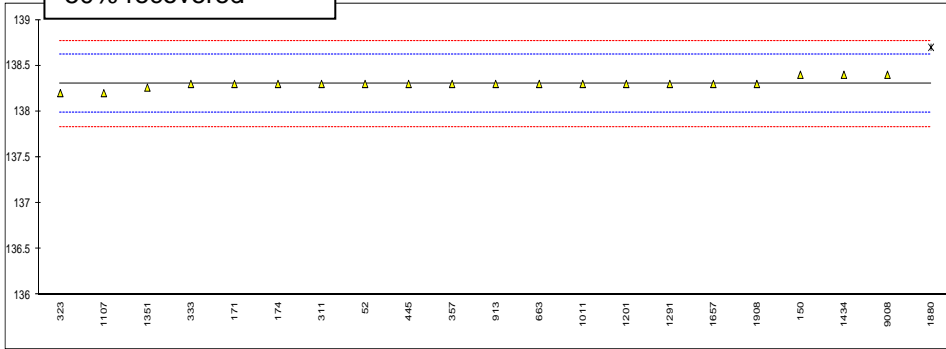
lab	method	mode	IBP	mark	z(targ)	50%rec	mark	z(targ)	DP	mark	z(targ)
52	D850	Automated	137.6		-0.58	138.3		-0.02	138.3		-1.06
150	D850	Automated	137.9		0.29	138.4		0.62	138.5		0.37
158			----		----			----			----
171	D850	Automated	138.0		0.58	138.3		-0.02	138.3		-1.06
174	D850	Automated	137.5		-0.87	138.3		-0.02	138.5		0.37
311	D850	Automated	137.8		0.00	138.3		-0.02	138.5		0.37
323	D850	Manual	137.5		-0.87	138.2		-0.66	138.5		0.37
333	D850	Automated	136.9	R(0.05)	-2.62	138.3		-0.02	138.4		-0.35
357	D850	Automated	138.0		0.58	138.3		-0.02	138.3		-1.06
391			----		----			----			----
444			----		----			----			----
445	D850	Manual	137.9		0.29	138.3		-0.02	138.5		0.37
551			----		----			----			----
555			----		----			----			----
557			----		----			----			----
558			----		----			----			----
663	D850	Automated	138.0		0.58	138.3		-0.02	138.4		-0.35
913	D850	Manual	137.5		-0.87	138.3		-0.02	138.6		1.09
1011	D850	Automated	137.1	R(0.05)	-2.04	138.3		-0.02	138.4		-0.35
1041			----		----			----			----
1067			----		----			----			----
1081	D850	Automated	137.9		0.29	----		----	138.6		1.09
1107	D850	Automated	137.9		0.29	138.2		-0.66	138.3		-1.06
1161			----		----			----			----
1201	D850	Automated	136.1	C,R(0.01)	-4.94	138.3		-0.02	138.4		-0.35
1291	D850	Automated	138		0.58	138.3		-0.02	138.4		-0.35
1351	D850	Manual	137.72		-0.24	138.26		-0.27	138.51		0.44
1434	D850	Automated	137.9		0.29	138.4		0.62	138.5		0.37
1538			----		----			----			----
1657	D850	Automated	137.7		-0.29	138.3		-0.02	138.5		0.37
1852			----		----			----			----
1866			----		----			----			----
1880	D850	Automated	137.6		-0.58	138.7	R(0.01)	2.53	138.9	R(0.01)	3.24
1908	D850	Automated	138.0		0.58	138.3		-0.02	138.5		0.37
9008	D850	Automated	137.8		0.00	138.4		0.62	138.5		0.37
	normality		OK			suspect			OK		
	n		19			20			21		
	outliers		3			1			1		
	mean (n)		137.80			138.30			138.45		
	st.dev.(n)		0.185			0.052			0.093		
	R(calc.)		0.52			0.15			0.26		
	R(D850:11 - automated)		0.96			0.44			0.39		

Lab 1201: first reported 135.8

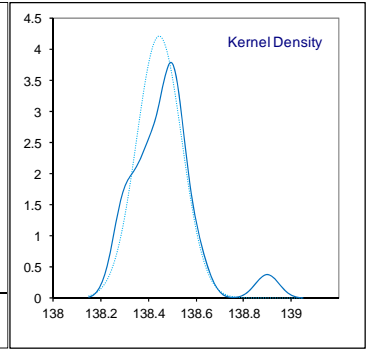
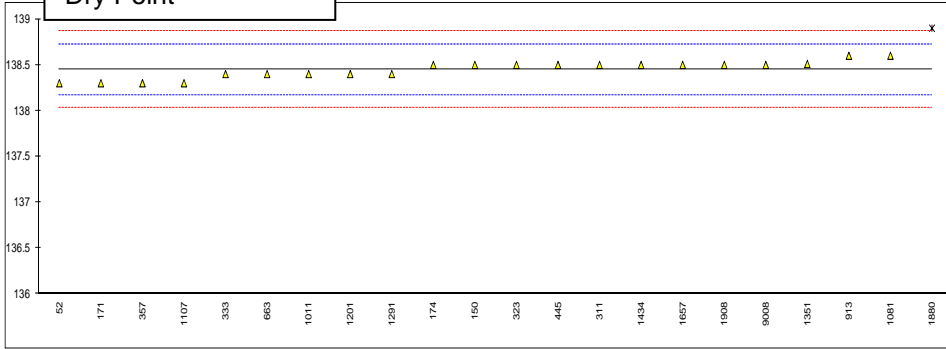
Initial Boiling Point



50% recovered

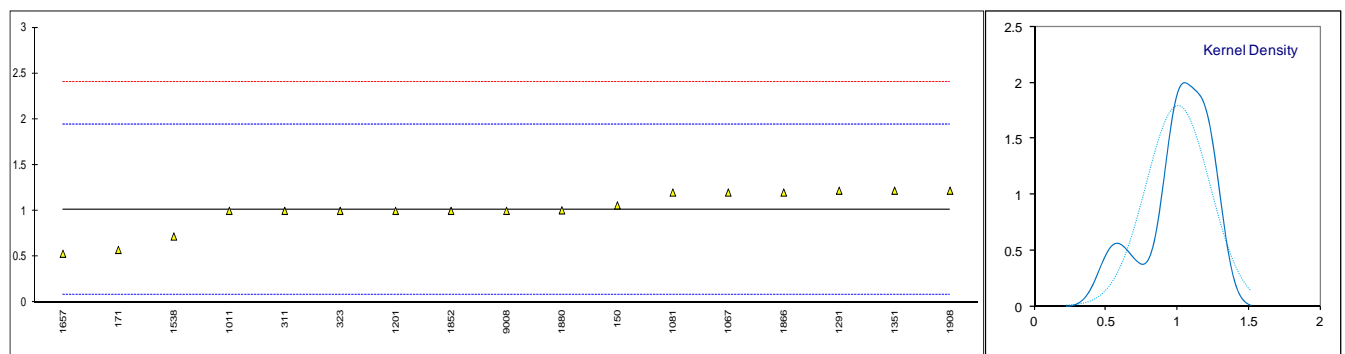


Dry Point



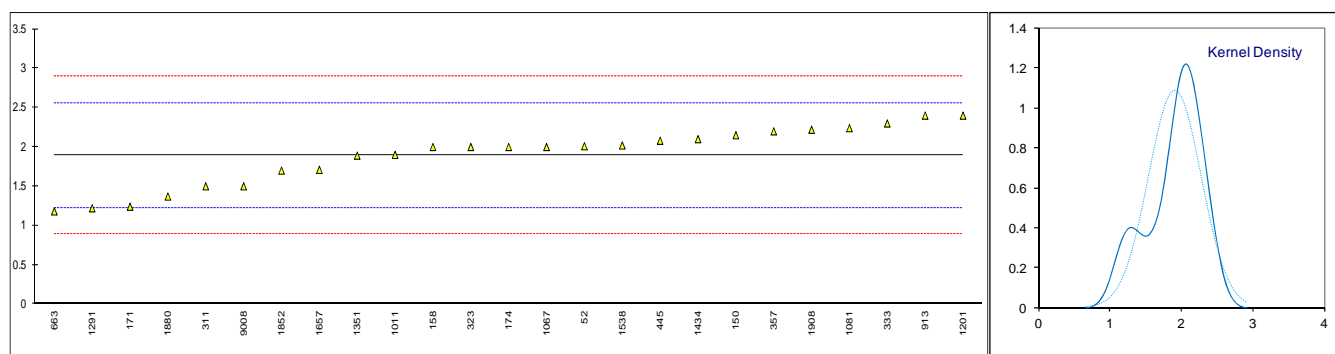
Determination of Organic Chloride in p-Xylene sample #14191; results in mg/kg.

lab	method	value	mark	z(targ)	remarks
52		----		----	
150	D7359	1.06		0.11	
158		----		----	
171	D5808	0.574		-0.94	
174		----		----	
311	D5808	1		-0.02	
323	D5808	1		-0.02	
333		----		----	
357		----		----	
391		----		----	
444		----		----	
445		----		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D5808	< 1		----	
913		----		----	
1011	D5808	1		-0.02	
1041		----		----	
1067	D5808	1.2		0.41	
1081	D5808	1.2		0.41	
1107		----		----	
1161		----		----	
1201	UOP779	1		-0.02	
1291	D5808	1.22		0.45	
1351	D5808	1.22		0.45	
1434		----		----	
1538	UOP779	0.72		-0.62	
1657	D5808	0.5323		-1.03	
1852	DIN51408	1		-0.02	
1866	D5808	1.2		0.41	
1880	D7359	1.006		-0.01	
1908	D5808	1.22		0.45	
9008	D5808	1.0		-0.02	
	normality	OK			
	n	17			
	outliers	0	<u>Spike</u>		
	mean (n)	1.009	1.08		Recovery: <94%
	st.dev. (n)	0.2159			
	R(calc.)	0.605			
	R(D5808:09a)	1.300			Compare R(UOP779) = 0.275



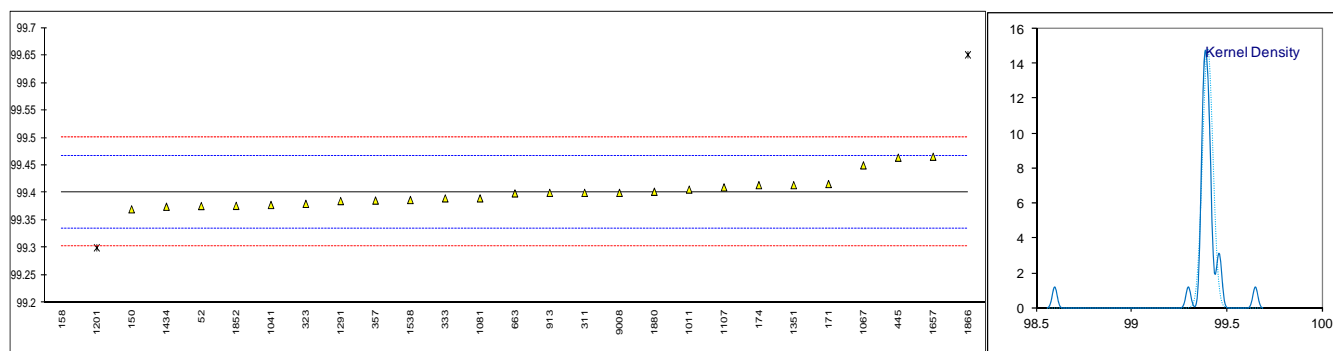
Determination of Sulphur in p-Xylene sample #14191; results in mg/kg.

lab	method	value	mark	z(targ)	remarks
52	D5453	2.01		0.35	
150	D5453	2.15		0.77	
158	D5453	2.0		0.32	
171	D5453	1.24		-1.95	
174	D5453	2.0		0.32	
311	D5453	1.5		-1.18	
323	D5453	2		0.32	
333	D5453	2.3		1.22	
357	D7183	2.2		0.92	
391		----		----	
444		----		----	
445	D5453	2.08		0.56	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D5453	1.18		-2.13	
913	D5453	2.4		1.52	
1011	ISO20846	1.9		0.02	
1041		----		----	
1067	D5453	2.0		0.32	
1081	D7183	2.24		1.04	
1107		----		----	
1161		----		----	
1201	D5453	2.4		1.52	
1291	D4294	1.22		-2.01	
1351	D7183	1.89		-0.01	
1434	D5453	2.1		0.62	
1538	D7183	2.02		0.38	
1657	D5453	1.71		-0.55	
1852	ISO20846	1.7		-0.58	
1866		----		----	
1880	D5453	1.37		-1.57	
1908	D5453	2.22		0.98	
9008	D5453	1.5		-1.18	
normality		OK			
n		25			
outliers		0	<u>Spike</u>		
mean (n)		1.893	2.02		Recovery < 95%
st.dev. (n)		0.3687			
R(calc.)		1.032			
R(D5453:12)		0.936			



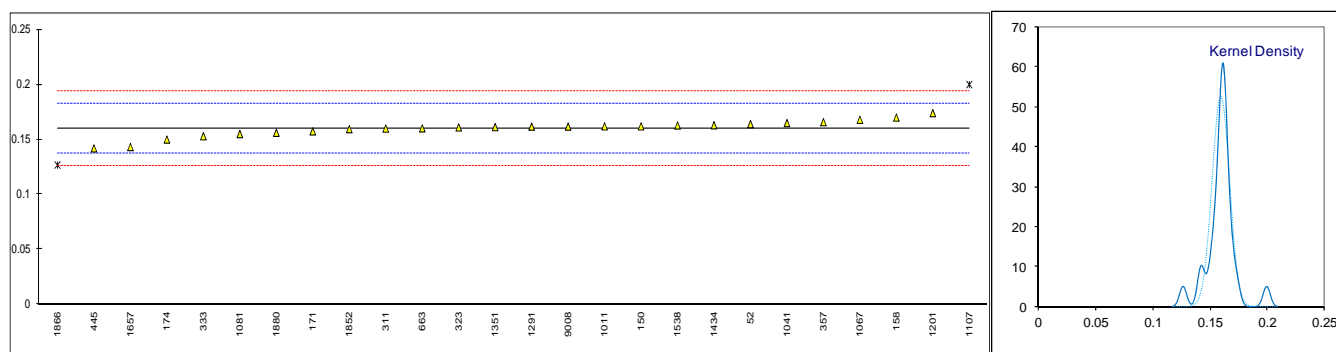
Determination of Purity of p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	99.376		-0.77	
150	D3798	99.37		-0.95	
158	D2360	98.600	R(0.01)	-24.16	
171	D3798	99.41601		0.44	
174	D7504	99.414		0.38	
311	D3798	99.40		-0.04	
323	D5917	99.38		-0.65	
333	D5917	99.39		-0.34	
357	D7504	99.386		-0.47	
391		----		----	
444		----		----	
445	D6563	99.464		1.89	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	99.399		-0.07	
913	D3798	99.40		-0.04	
1011	D5917	99.406		0.14	
1041	in house	99.378		-0.71	
1067	D3798	99.45		1.46	
1081	D3798	99.39		-0.34	
1107	in house	99.41		0.26	
1161		----		----	
1201	D5917	99.30	R(0.05)	-3.06	
1291	D7501	99.3851		-0.49	
1351	D3798	99.414		0.38	
1434	D7504	99.3747		-0.81	
1538	D7504	99.387		-0.43	
1657	D5917	99.4657		1.94	
1852	DIN51437	99.3764		-0.75	
1866	D5917	99.651	R(0.01)	7.52	
1880	D3798	99.402		0.02	
1908		----		----	
9008	UOP720	99.40		-0.04	
	normality	not OK			
	n	24			
	outliers	3			
	mean (n)	99.4014			
	st.dev. (n)	0.02637			
	R(calc.)	0.0738			
	R(D3798:03)	0.0929			



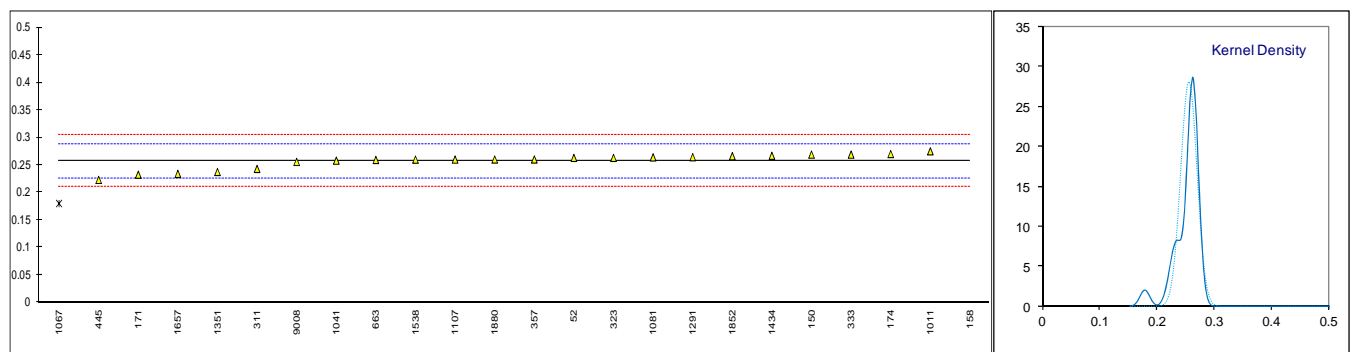
Determination of o-Xylene in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0.164		0.35	
150	D3798	0.162		0.18	
158	D2360	0.170		0.88	
171	D3798	0.157437		-0.22	
174	D7504	0.150		-0.87	
311	D3798	0.160		0.00	
323	D5917	0.161		0.09	
333	D5917	0.153		-0.61	
357	D7504	0.1658		0.51	
391		----		----	
444		----		----	
445	D6563	0.142		-1.57	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.1602		0.02	
913		----		----	
1011	D5917	0.162		0.18	
1041	in house	0.165		0.44	
1067	D3798	0.168		0.70	
1081	D3798	0.155		-0.43	
1107	in house	0.20	R(0.01)	3.50	
1161		----		----	
1201	D5917	0.174		1.23	
1291	D7504	0.1618		0.16	
1351	D3798	0.1613		0.12	
1434	D7504	0.1630		0.27	
1538	D7504	0.1628		0.25	
1657	D5917	0.1432		-1.47	
1852	DIN51437	0.1595		-0.04	
1866	D5917	0.1268	R(0.01)	-2.90	
1880	D3798	0.1561		-0.34	
1908		----		----	
9008	UOP720	0.1618		0.16	
	normality	suspect			
	n	24			
	outliers	2			
	mean (n)	0.1600			
	st.dev. (n)	0.00743			
	R(calc.)	0.0208			
	R(D3798:03)	0.0320			



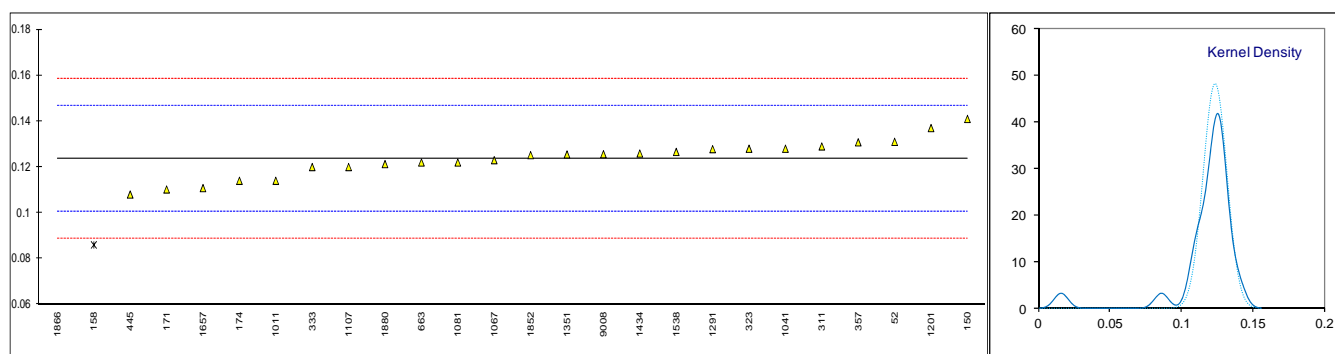
Determination of m-Xylene in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0.263		0.38	
150	D3798	0.269		0.76	
158	D2360	1.030	R(0.01)	48.97	
171	D3798	0.232467		-1.55	
174	D7504	0.270		0.83	
311	D3798	0.243		-0.89	
323	D5917	0.263		0.38	
333	D5917	0.269		0.76	
357	D7504	0.2602		0.20	
391		----		----	
444		----		----	
445	D6563	0.223		-2.15	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.2593		0.15	
913		----		----	
1011	D5917	0.275	C	1.14	First reported 0.137
1041	in house	0.258		0.07	
1067	D3798	0.180	R(0.01)	-4.88	
1081	D3798	0.264		0.45	
1107	in house	0.26		0.19	
1161		----		----	
1201		----	W	----	Result withdrawn, reported 0.343
1291	D7504	0.2643		0.46	
1351	D3798	0.2374		-1.24	
1434	D7504	0.2668		0.62	
1538	D7504	0.2599		0.19	
1657	D5917	0.2340		-1.46	
1852	DIN51437	0.2662		0.58	
1866		----		----	
1880	D3798	0.2601		0.20	
1908		----		----	
9008	UOP720	0.2557		-0.08	
	normality	OK			
	n	22			
	outliers	2			
	mean (n)	0.2570			
	st.dev. (n)	0.01388			
	R(calc.)	0.0389			
	R(D3798:03)	0.0442			



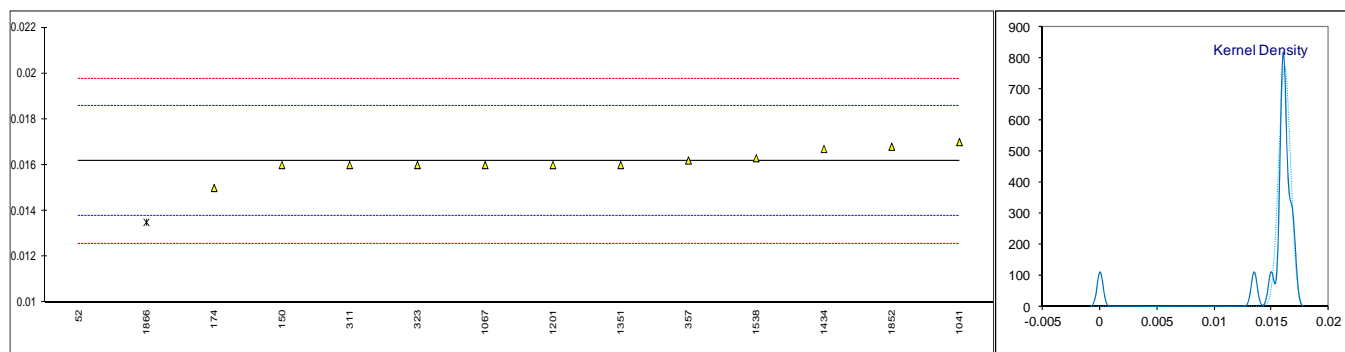
Determination of Ethylbenzene in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0.131		0.63	
150	D3798	0.141		1.49	
158	D2360	0.086	R(0.01)	-3.23	
171	D3798	0.110200		-1.15	
174	D7504	0.114		-0.83	
311	D3798	0.129		0.46	
323	D5917	0.128		0.38	
333	D5917	0.120		-0.31	
357	D7504	0.1308		0.62	
391		----		----	
444		----		----	
445	D6563	0.108		-1.34	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.1220		-0.14	
913		----		----	
1011	D5917	0.114		-0.83	
1041	in house	0.128		0.38	
1067	D3798	0.123		-0.05	
1081	D3798	0.122		-0.14	
1107	in house	0.12		-0.31	
1161		----		----	
1201	D5917	0.137		1.15	
1291	D7504	0.1278		0.36	
1351	D3798	0.1255		0.16	
1434	D7504	0.1259		0.20	
1538	D7504	0.1266		0.26	
1657	D5917	0.1108		-1.10	
1852	DIN51437	0.1252		0.14	
1866	D5917	0.0158	R(0.01)	-9.26	
1880	D3798	0.1213		-0.20	
1908		----		----	
9008	UOP720	0.1256		0.17	
	normality	OK			
	n	24			
	outliers	2			
	mean (n)	0.1236			
	st.dev. (n)	0.00809			
	R(calc.)	0.0227			
	R(D3798:03)	0.0326			



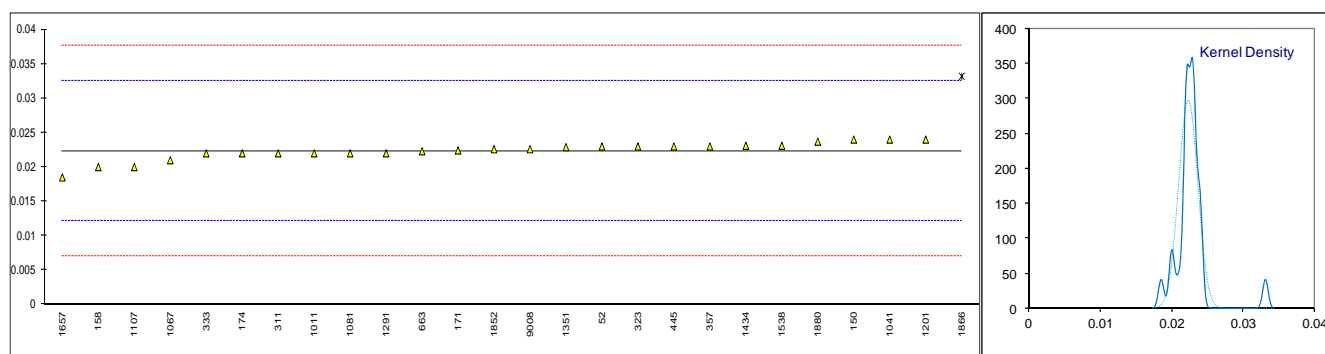
Determination of Styrene in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0	G(0.01)	-13.44	
150	D3798	0.016		-0.14	
158		----		----	
171		----		----	
174	D7504	0.015	C	-0.97	First reported 0.013
311	D3798	0.016		-0.14	
323	D5917	0.016		-0.14	
333		----		----	
357	D7504	0.0162		0.03	
391		----		----	
444		----		----	
445		----		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663		----		----	
913		----		----	
1011		----		----	
1041	in house	0.017		0.69	
1067		0.016		-0.14	
1081		----		----	
1107	in house	<0.01		<-13.31	False negative result?
1161		----		----	
1201	D5917	0.016		-0.14	
1291		----		----	
1351	D3798	0.0160		-0.14	
1434	D7504	0.0167		0.44	
1538	D7504	0.0163		0.11	
1657		----		----	
1852	DIN51437	0.0168		0.53	
1866	D5917	0.0135	G(0.01)	-2.22	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	suspect			
	n	12			
	outliers	2	<u>Spike</u>		
	mean (n)	0.0162	0.0161		Recovery <101%
	st.dev. (n)	0.00052			
	R(calc.)	0.0014			
	R(Horwitz)	0.0034			



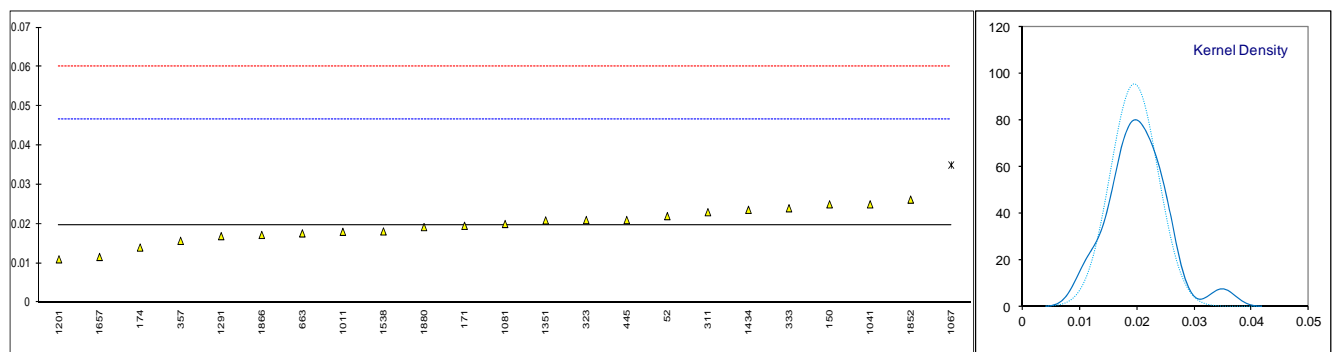
Determination of Toluene in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0.023		0.13	
150	D3798	0.024		0.33	
158	D2360	0.020		-0.45	
171	D3798	0.0224213		0.02	
174	D7504	0.022		-0.06	
311	D3798	0.022		-0.06	
323	D5917	0.023		0.13	
333	D5917	0.022		-0.06	
357	D7504	0.0230		0.13	
391		----		----	
444		----		----	
445	D6563	0.023		0.13	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.0223		-0.01	
913		----		----	
1011	D5917	0.022		-0.06	
1041	in house	0.024		0.33	
1067	D3798	0.021		-0.26	
1081	D3798	0.022		-0.06	
1107	in house	0.02		-0.45	
1161		----		----	
1201	D5917	0.024		0.33	
1291	D7504	0.022		-0.06	
1351	D3798	0.0229		0.11	
1434	D7504	0.0231		0.15	
1538	D7504	0.0231		0.15	
1657	D5917	0.0185		-0.75	
1852	DIN51437	0.0226		0.05	
1866	D5917	0.0332	R(0.01)	2.12	
1880	D3798	0.0237		0.27	
1908		----		----	
9008	UOP720	0.0226		0.05	
	normality	suspect			
	n	25			
	outliers	1	<u>Spike</u>		
	mean (n)	0.0223	0.0182		Recovery < 123%
	st.dev. (n)	0.00132			
	R(calc.)	0.0037			
	R(D3798:03)	0.0144			



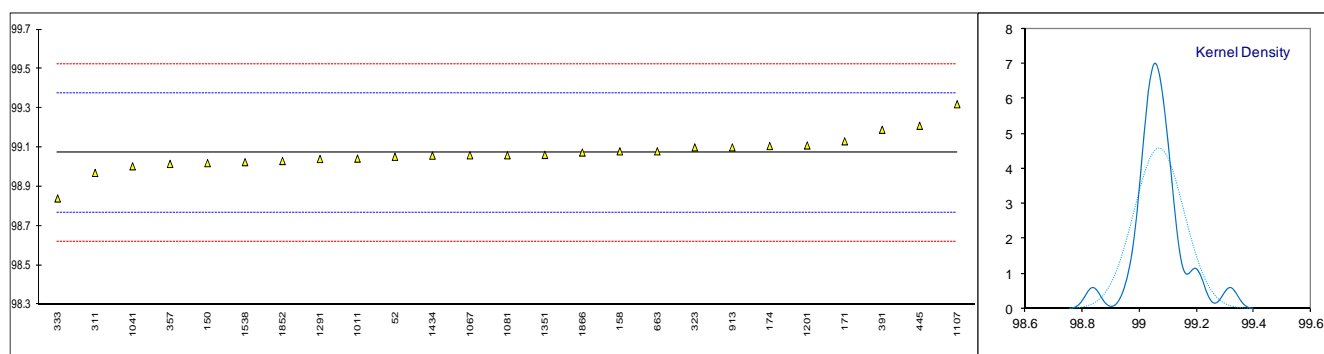
Determination of Nonaromatics in p-Xylene sample #14191; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D5917	0.022		0.19	
150	D3798	0.025		0.42	
158		----		----	
171	D3798	0.019525		0.01	
174	D7504	0.014		-0.40	
311	D3798	0.023		0.27	
323	D5917	0.021		0.12	
333	D5917	0.024		0.34	
357	D7504	0.0157		-0.28	
391		----		----	
444		----		----	
445	D6563	0.021		0.12	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.0176		-0.13	
913		----		----	
1011	D5917	0.018		-0.10	
1041	in house	0.025		0.42	
1067	D3798	0.035	R(0.05)	1.16	
1081	D3798	0.020		0.04	
1107	in house	<0.01		----	
1161		----		----	
1201	D5917	0.011		-0.63	
1291	D7504	0.0169		-0.19	
1351	D3798	0.0209		0.11	
1434	D7504	0.0236		0.31	
1538	D7504	0.0181		-0.10	
1657	D5917	0.0116		-0.58	
1852	DIN51437	0.0262		0.51	
1866	D5917	0.0172		-0.16	
1880	D3798	0.0192		-0.02	
1908		----		----	
9008	UOP720	0.0157		-0.28	
	normality	OK			
	n	23			
	outliers	1			
	mean (n)	0.0194			
	st.dev. (n)	0.00416			
	R(calc.)	0.0117			
	R(D3798:03)	0.0375			



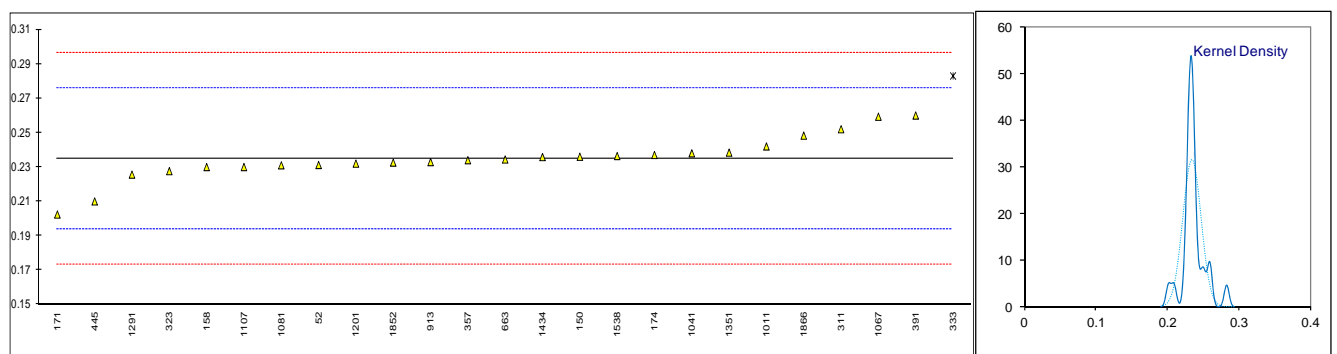
Determination of Purity of o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	99.0523		-0.13	
150	D3797	99.02		-0.34	
158	D2360	99.08		0.06	
171	D3797	99.13108		0.39	
174	D7504	99.107		0.24	
311	D3797	98.97		-0.67	
323	D7504	99.10		0.19	
333	D3797	98.84		-1.53	
357	D7504	99.016		-0.37	
391	D2360	99.19		0.78	
444		----		----	
445	D6563	99.210		0.92	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	99.08	C	0.06	First reported 99.059
913	D3797	99.10		0.19	
1011	D3797	99.043		-0.19	
1041	in house	99.004		-0.45	
1067	in house	99.06		-0.08	
1081	D3797	99.06		-0.08	
1107	in house	99.32		1.64	
1161		----		----	
1201	D5917	99.11		0.26	
1291	D7504	99.0411		-0.20	
1351	D3797	99.062		-0.06	
1434	D3797	99.0582		-0.09	
1538	D7504	99.025		-0.31	
1657		----		----	
1852	DIN51437	99.0310		-0.27	
1866	D5917	99.074		0.02	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	not OK			
	n	25			
	outliers	0			
	mean (n)	99.0714			
	st.dev. (n)	0.08748			
	R(calc.)	0.2449			
	R(D3797:05)	0.4235			



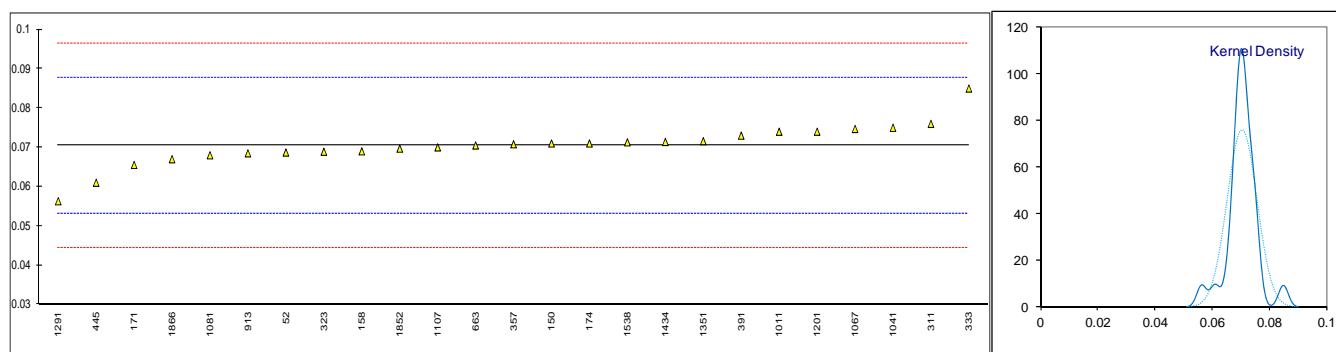
Determination of m-Xylene in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.2312		-0.18	
150	D3797	0.236	C	0.06	First reported 0.072
158	D2360	0.23		-0.24	
171	D3797	0.202394		-1.59	
174	D7504	0.237		0.10	
311	D3797	0.252		0.84	
323	D7504	0.2276		-0.36	
333	D3797	0.283	R(0.05)	2.35	
357	D7504	0.2340		-0.04	
391	D2360	0.260		1.23	
444		----		----	
445	D6563	0.210		-1.22	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.2344		-0.02	
913	D3797	0.2329		-0.10	
1011	D3797	0.242		0.35	
1041	in house	0.238		0.15	
1067	in house	0.2593		1.19	
1081	D3797	0.231		-0.19	
1107	in house	0.23		-0.24	
1161		----		----	
1201	D5917	0.232		-0.14	
1291	D7504	0.2256		-0.45	
1351	D3797	0.2384		0.17	
1434	D3797	0.2358		0.05	
1538	D7504	0.2364		0.07	
1657		----		----	
1852	DIN51437	0.2326		-0.11	
1866	D5917	0.2483		0.66	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	suspect			
	n	24			
	outliers	1			
	mean (n)	0.2349			
	st.dev. (n)	0.01267			
	R(calc.)	0.0355			
	R(D3797:05)	0.0573			



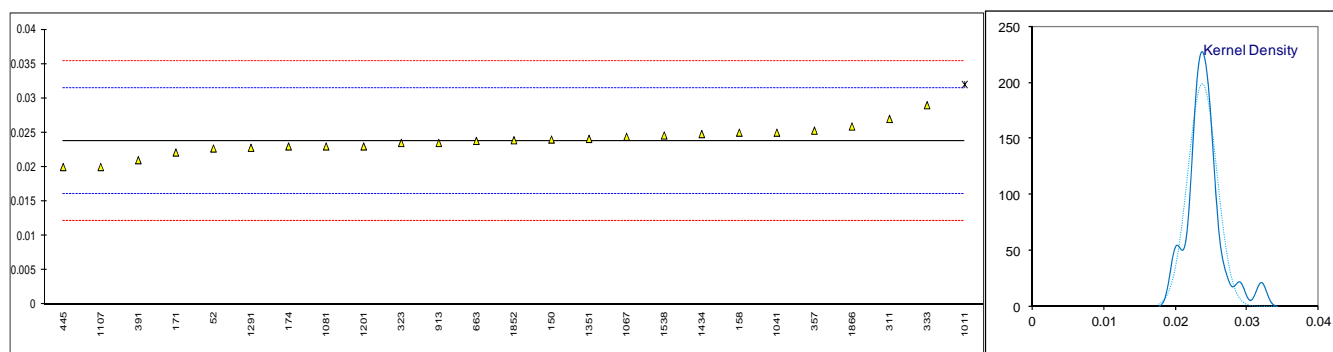
Determination of p-Xylene in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0687		-0.21	
150	D3797	0.071	C	0.06	First reported 0.234
158	D2360	0.069		-0.17	
171	D3797	0.0655403		-0.57	
174	D7504	0.071		0.06	
311	D3797	0.076		0.64	
323	D7504	0.0689		-0.18	
333	D3797	0.085		1.68	
357	D7504	0.0708		0.04	
391	D2360	0.073		0.29	
444		----		----	
445	D6563	0.061		-1.10	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.0705	C	0.00	First reported 0.0988
913	D3797	0.0685		-0.23	
1011	D3797	0.074		0.41	
1041	in house	0.075		0.52	
1067	in house	0.0747		0.49	
1081	D3797	0.068		-0.29	
1107	in house	0.07		-0.06	
1161		----		----	
1201	D5917	0.074		0.41	
1291	D7504	0.0563		-1.64	
1351	D3797	0.0716		0.13	
1434	D3797	0.0714		0.11	
1538	D7504	0.0713		0.10	
1657		----		----	
1852	DIN51437	0.0697		-0.09	
1866	D5917	0.067		-0.40	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	not OK			
	n	25			
	outliers	0			
	mean (n)	0.0705			
	st.dev. (n)	0.00525			
	R(calc.)	0.0147			
	R(D3797:05)	0.0242			



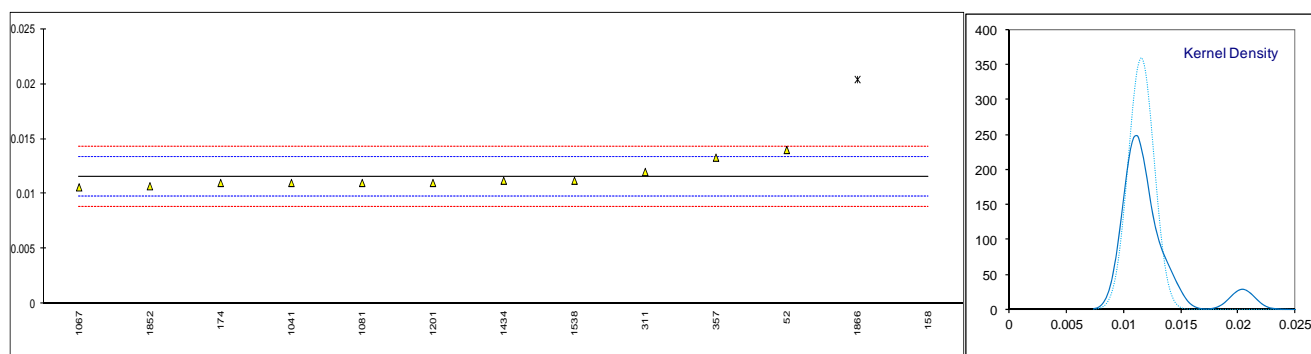
Determination of Ethylbenzene in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0227		-0.29	
150	D3797	0.024		0.05	
158	D2360	0.025		0.31	
171	D3797	0.0221123		-0.44	
174	D7504	0.023		-0.21	
311	D3797	0.027		0.83	
323	D7504	0.0235		-0.08	
333	D3797	0.029		1.34	
357	D7504	0.0253		0.39	
391	D2360	0.021		-0.73	
444		----		----	
445	D6563	0.020		-0.99	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.0238		0.00	
913	D3797	0.0235		-0.08	
1011	D3797	0.032	R(0.05)	2.12	
1041	in house	0.025		0.31	
1067	in house	0.0244		0.15	
1081	D3797	0.023		-0.21	
1107	in house	0.02		-0.99	
1161		----		----	
1201	D5917	0.023		-0.21	
1291	D7504	0.0228		-0.26	
1351	D3797	0.0241		0.08	
1434	D3797	0.0248		0.26	
1538	D7504	0.0246		0.20	
1657		----		----	
1852	DIN51437	0.0239		0.02	
1866	D5917	0.0259		0.54	
1880		----		----	
1908		----		----	
9008		----		----	
normality		suspect			
n		24			
outliers		1	<u>Spike</u>		
mean (n)		0.0238	0.0229		Recovery <104%
st.dev. (n)		0.00201			
R(calc.)		0.0056			
R(D3797:05)		0.0108			



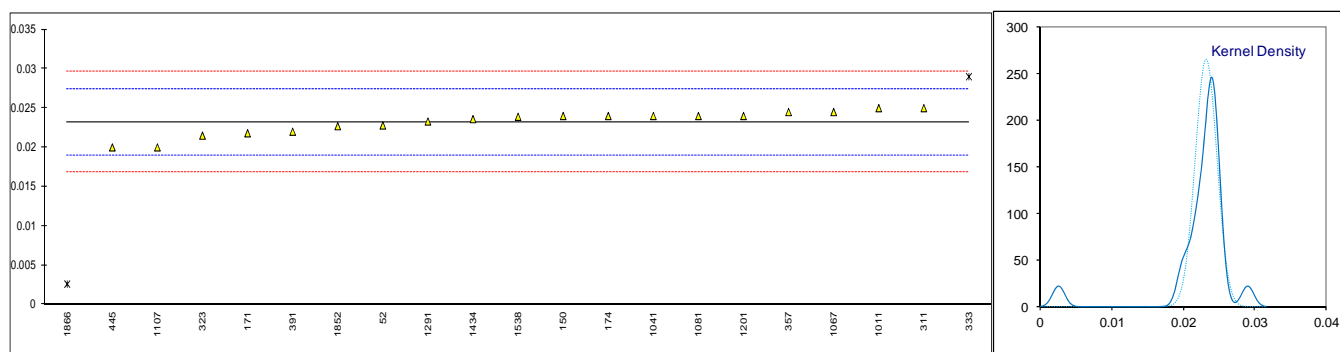
Determination of n-Propylbenzene in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0140		2.72	
150		----		----	
158	D2360	0.093	G(0.01)	90.12	
171	D3797	<0.001		<-11.76	False negative result?
174	D7504	0.011		-0.60	
311	D3797	0.012		0.50	
323		----		----	
333		----		----	
357	D7504	0.0133		1.94	
391		----		----	
444		----		----	
445		----		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663		----		----	
913		----		----	
1011		----		----	
1041	in house	0.011		-0.60	
1067	in house	0.0106		-1.05	
1081	D3797	0.011		-0.60	
1107		----		----	
1161		----		----	
1201	D5917	0.011		-0.60	
1291		----		----	
1351		----		----	
1434		0.0112		-0.38	
1538	D7504	0.0112		-0.38	
1657		----		----	
1852	DIN51437	0.0107		-0.94	
1866	D5917	0.0204	G(0.01)	9.80	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	not OK			
	n	11			
	outliers	2			
	mean (n)	0.0115			
	st.dev. (n)	0.00111			
	R(calc.)	0.0031			
	R(Horwitz)	0.0025			



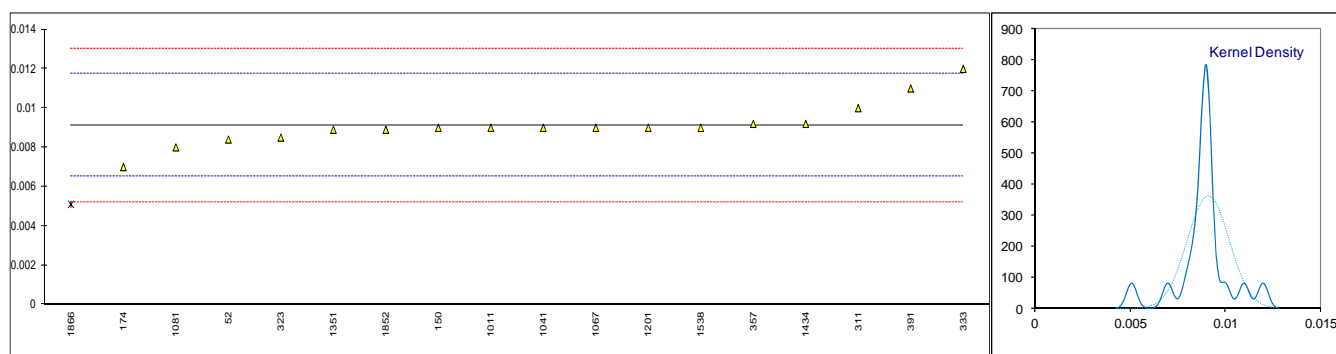
Determination of iso-Propylbenzene (cumene) in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0228		-0.18	
150	D3797	0.024	C	0.38	First reported 0.007
158		-----		-----	
171	D3797	0.0218017		-0.65	
174	D7504	0.024		0.38	
311	D3797	0.025		0.85	
323	D7504	0.0215		-0.79	
333	D3797	0.029	R(0.05)	2.72	
357	D7504	0.0245		0.61	
391	D2360	0.022		-0.56	
444		-----		-----	
445	D6563	0.020		-1.49	
551		-----		-----	
555		-----		-----	
557		-----		-----	
558		-----		-----	
663		-----		-----	
913		-----		-----	
1011	D3797	0.025		0.85	
1041	in house	0.024		0.38	
1067	in house	0.0245		0.61	
1081	D3797	0.024		0.38	
1107	in house	0.02		-1.49	
1161		-----		-----	
1201	D5917	0.024		0.38	
1291	D7504	0.0233		0.05	
1351		-----		-----	
1434	D3797	0.0236		0.19	
1538	D7504	0.0239		0.33	
1657		-----		-----	
1852	DIN51437	0.0227		-0.23	
1866	D5917	0.0026	R(0.01)	-9.64	
1880		-----		-----	
1908		-----		-----	
9008		-----		-----	
	normality	OK			
	n	19			
	outliers	2			
	mean (n)	0.0232			
	st.dev. (n)	0.00151			
	R(calc.)	0.0042			
	R(D3797:05)	0.0060			



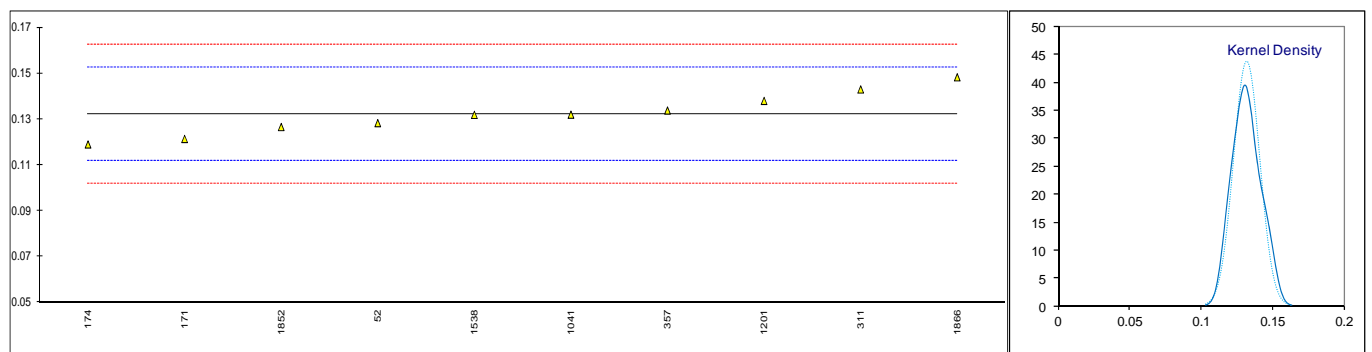
Determination of Styrene in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.0084		-0.56	
150	D3797	0.009		-0.09	
158		----		----	
171	D3797	<0.001		<-6.30	False negative result?
174	D7504	0.007		-1.63	
311	D3797	0.010		0.67	
323	D7504	0.0085		-0.48	
333	D3797	0.012		2.21	
357	D7504	0.0092		0.06	
391	D2360	0.011		1.44	
444		----		----	
445		----		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663		----		----	
913		----		----	
1011	D3797	0.009		-0.09	
1041	in house	0.009		-0.09	
1067	in house	0.009		-0.09	
1081	D3797	0.008		-0.86	
1107	in house	<0.01		----	
1161		----		----	
1201	D5917	0.009		-0.09	
1291		----		----	
1351	D3797	0.0089		-0.17	
1434	D3797	0.0092		0.06	
1538	D7504	0.0090		-0.09	
1657		----		----	
1852	DIN51437	0.0089		-0.17	
1866	D5917	0.0051	G(0.05)	-3.09	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	not OK			
	n	17			
	outliers	1	<u>Spike</u>		
	mean (n)	0.0091	0.0100		Recovery <91%
	st.dev. (n)	0.00110			
	R(calc.)	0.0031			
	R(D3797:05)	0.0036			



Determination of Sum of Ethyltoluenes in o-Xylene sample #14192; results in %M/M.

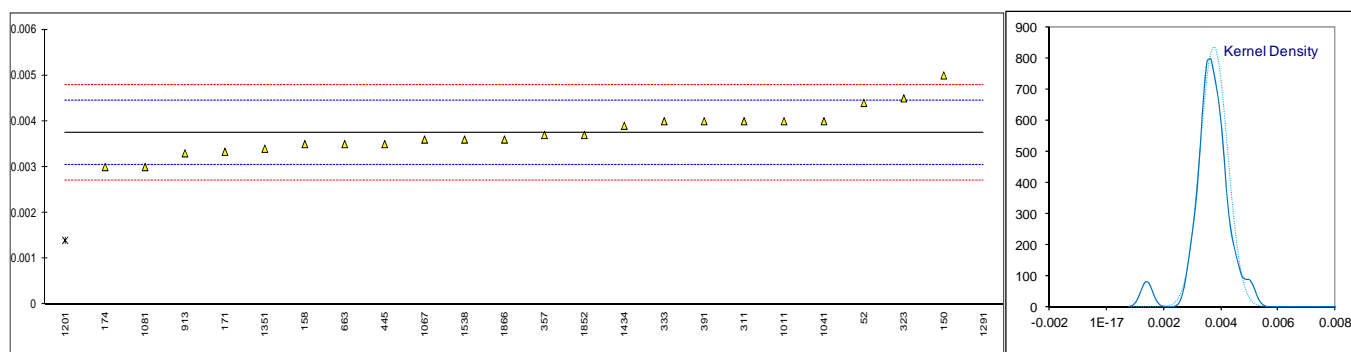
lab	method	value	mark	z(targ)	remarks
52	D7504	0.1283		-0.39	
150		----		----	
158		----		----	
171	D3797	0.121385	C	-1.07	First reported 0.0418178
174	D7504	0.119		-1.30	
311	D3797	0.143		1.06	
323		----		----	
333		----		----	
357	D7504	0.1338	C	0.15	First reported 0.0037
391		----		----	
444		----		----	
445		----		----	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663		----		----	
913		----		----	
1011		----		----	
1041	in house	0.132		-0.02	
1067		----		----	
1081		----		----	
1107		----		----	
1161		----		----	
1201	D5917	0.138		0.57	
1291		----		----	
1351		----		----	
1434		----		----	
1538	D7504	0.1319		-0.03	
1657		----		----	
1852	DIN51437	0.1266		-0.55	
1866	D5917	0.1483		1.58	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	OK			
	n	10			
	outliers	0			
	mean (n)	0.1322			
	st.dev. (n)	0.00913			
	R(calc.)	0.0256			
	R(Horwitz)	0.0284			



Determination of Toluene in o-Xylene sample #14192; results in %M/M.

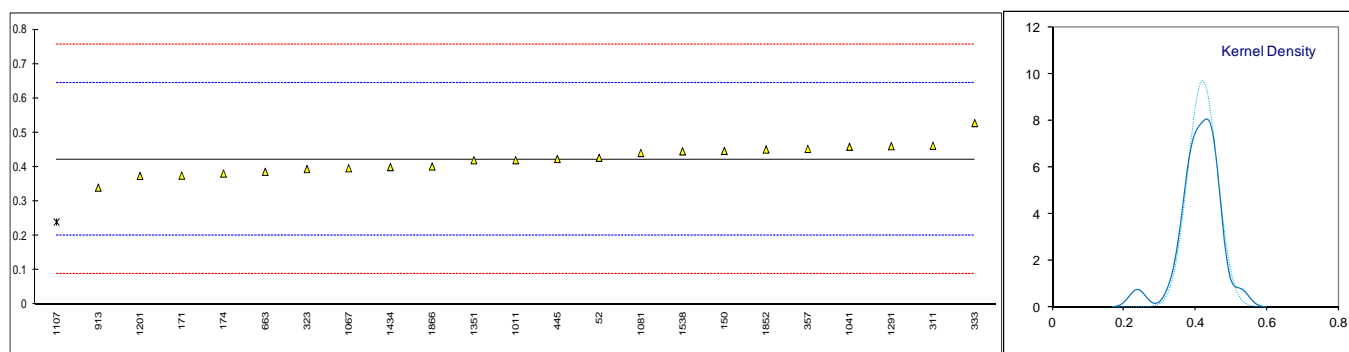
lab	method	value	mark	z(targ)	remarks
52	D7504	0.0044		1.86	
150	D3797	0.005		3.59	
158	D2360	0.0035		-0.72	
171	D3797	0.00333319		-1.20	
174	D7504	0.003		-2.16	
311	D3797	0.004		0.71	
323	D7504	0.0045		2.15	
333	D3797	0.004		0.71	
357	D7504	0.0037	C	-0.15	First reported 0.1338
391	D2360	0.004		0.71	
444		----		----	
445	D6563	0.0035		-0.72	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.0035		-0.72	
913	D3797	0.0033		-1.30	
1011	D3797	0.004		0.71	
1041	in house	0.004		0.71	
1067	in house	0.0036		-0.44	
1081	D3797	0.003		-2.16	
1107	in house	<0.01		----	
1161		----		----	
1201	D5917	0.0014	R(0.01)	-6.76	
1291	D7504	0.0349	R(0.01)	89.55	
1351	D3797	0.0034		-1.01	
1434	D3797	0.0039		0.43	
1538	D7504	0.0036		-0.44	
1657		----		----	
1852	DIN51437	0.0037		-0.15	
1866	D5917	0.0036		-0.44	
1880		----		----	
1908		----		----	
9008		----		----	

normality suspect
n 22
outliers 2
mean (n) 0.00375
st.dev. (n) 0.000476
R(calc.) 0.00133
R(Horwitz) 0.00097



Determination of Nonaromatics in o-Xylene sample #14192; results in %M/M.

lab	method	value	mark	z(targ)	remarks
52	D7504	0.4270		0.04	
150	D3797	0.447		0.22	
158		----		----	
171	D3797	0.375149	C	-0.42	First reported 0.143230
174	D7504	0.381		-0.37	
311	D3797	0.462		0.36	
323	D7504	0.3941		-0.25	
333	D3797	0.528		0.95	
357	D7504	0.4528		0.28	
391		----		----	
444		----		----	
445	D6563	0.4234		0.01	
551		----		----	
555		----		----	
557		----		----	
558		----		----	
663	D7504	0.3861		-0.32	
913	D3797	0.3400		-0.74	
1011	D3797	0.420		-0.02	
1041	in house	0.459		0.33	
1067	in house	0.3965		-0.23	
1081	D3797	0.441		0.17	
1107	in house	0.24	R(0.01)	-1.64	
1161		----		----	
1201	D5917	0.374		-0.43	
1291	D7504	0.4608		0.35	
1351	D3797	0.4198		-0.02	
1434	D3797	0.4000		-0.20	
1538	D7504	0.4457		0.21	
1657		----		----	
1852	DIN51437	0.4510		0.26	
1866	D5917	0.4017		-0.18	
1880		----		----	
1908		----		----	
9008		----		----	
	normality	OK			
	n	22			
	outliers	1			
	mean (n)	0.4221			
	st.dev. (n)	0.04117			
	R(calc.)	0.1153			
	R(D3797:05)	0.3118			



APPENDIX 2

List of number of participants per country

2 labs in BELGIUM
5 labs in BRAZIL
1 lab in CANADA
1 lab in CHINA, P.R. of
1 lab in FINLAND
1 lab in FRANCE
2 labs in GERMANY
1 lab in INDIA
1 lab in ISRAEL
1 lab in ITALY
2 labs in KUWAIT
1 lab in MALAYSIA
4 labs in NETHERLANDS
1 lab in POLAND
1 lab in PORTUGAL
1 lab in SAUDI ARABIA
1 lab in THAILAND
1 lab in TURKEY
4 labs in U.S.A.
2 labs 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
R(0.01)	= outlier in Rosner outlier test
R(0.05)	= straggler in Rosner outlier test
E	= error in calculations
U	= reported wrong unit
W	= result withdrawn on request of participant
n.e.	= not evaluated

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