

Results of Proficiency Test
Styrene
October 2015

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 analysis of Styrene. During the annual proficiency testing program 2015/2016, it was decided to organize again a round robin for the analysis of Styrene in accordance with the latest applicable version of the product specification ASTM D2827:13. In this interlaboratory study, 41 laboratories from 21 different countries have participated. See appendix 2 for the number of participants per country. In this report, the results of the 2015 Styrene proficiency test are presented and discussed. This report is also available as PDF file 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 to an accredited laboratory. It was decided to send one 0.5 liter bottle with Styrene (labelled #15190).

Participants were requested to report the analytical results using the indicated units and 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' (iis-protocol, version 3.3) of April 2014. This protocol can be downloaded from the iis website <http://www.iisnl.com>, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

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

participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

The necessary bulk material was obtained from a local Styrene producer. The approximately 40 litre was homogenised and 68 amber glass bottles of 0.5 L (labelled #15190) were filled. The homogeneity of subsamples of #15190 was checked by determination of Density at 20°C in accordance with ASTM D4052 and α -Methyl Styrene in accordance with ASTM D5135 on 8 stratified randomly selected samples.

	<i>Density at 20°C in kg/L</i>	<i>α-Methyl Styrene in mg/kg</i>
sample #15190-1	0.90622	247
sample #15190-2	0.90623	248
sample #15190-3	0.90622	251
sample #15190-4	0.90622	244
sample #15190-5	0.90623	249
sample #15190-6	0.90622	252
sample #15190-7	0.90622	244
sample #15190-8	0.90622	244

Table 1: homogeneity test results of subsamples #15190

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 at 20°C in kg/L</i>	<i>α-Methyl Styrene in mg/kg</i>
r (sample #15190)	0.00001	9
Ref. method	ISO 12185:96	ASTM D5135:14
0.3 x R (ref. method)	0.00015	32

Table 2: repeatabilities of subsamples #15190

The calculated repeatabilities were less than 0.3 times the corresponding reproducibility of the reference methods.

Therefore homogeneity of the subsamples of #15190 was assumed.

To each of the participating laboratories, 1 bottle of 0.5 L (labelled #15190) was sent on September 23, 2015.

2.5 STABILITY OF THE SAMPLES

The stability of Styrene, packed in a brown glass bottle, was checked in the past. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were asked to determine on sample #15190: Aldehydes as benzaldehyde, Appearance, Chloride (Organic), Colour Pt/Co, Density at 20°C, Inhibitor as TBC, Peroxide as H₂O₂, Polymer, Sulphur, Water (coulometric KF titration), Purity and the Impurities by GC: Benzene, Toluene, Ethylbenzene, m- & p- Xylenes, Iso-propylbenzene (Cumene), o-Xylene, n-Propylbenzene, m- & p-Ethyltoluenes, α -Methylstyrene, 1,2-diethylbenzene, sum α -Methylstyrene and 1,2-diethylbenzene, Phenylacetylene, 3-&4-dimethylstyrenes, sum Phenylacetylene and 3-&4-dimethylstyrenes, Benzaldehyde and Nonaromatics.

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.kmpd.co.uk/sgs-iis/. A SDS and a form to confirm receipt of the samples were added to the sample package. After closure of the data entry portal a detailed report form was made available for download on the iis website www.iisnl.com for participants who were too late with reporting.

3 RESULTS

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

Directly after deadline, a reminder 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 raw data of the reported 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 (ref. 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. Also a normal Gauss curve was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. In order to be able to have an objective evaluation of the performance of each participant, it was decided to evaluate this performance against the literature requirements, e.g. ASTM reproducibilities. Therefore the z-scores were calculated using a target standard deviation. This target standard deviation was calculated from the literature reproducibility (R) by division with 2.8.

When a laboratory 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 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
$3 < z $	unsatisfactory

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples to the laboratories in Brazil and Saudi Arabia. These laboratories received the samples late or not at all. Three participants reported results after the final reporting date and four laboratories did not report any result at all. Not all participants were able to report all requested parameters. Finally, 37 laboratories did report 447 numerical results. Observed were 20 outlying results, which is 4.5%. 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 test. The standard reproducibilities used for the evaluation of the GC impurities were extrapolated from the reproducibilities, as mentioned in ASTM D5135:14 (table 3 or 4 of the ASTM D5135 method) or calculated using the Horwitz equation when no precision data was mentioned in ASTM D5135:14 or when $R_{D5135} < R_{\text{Horwitz}}$.

In iis PT reports, ASTM methods are referred to with a number (e.g. D1209) and an added designation for the year that the method was adopted or revised (e.g. D1209:05). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D1209:05 (2011)). 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, see also paragraph 3.1.

One lab (1429) reported; “Toluene is our internal standard and the attempts to work with your sample containing Toluene appears compromised”. On request of this participant all GC results were withdrawn.

Aldehydes as benzaldehyde:

This determination was very problematic. One statistical outlier was observed. Two participants reported a value lower than the Benzaldehyde content by GC and the test results were therefore excluded from the statistical evaluation. The calculated reproducibility, after rejection of the statistical outlier and the suspected values, is not at all in agreement with the requirements of ASTM D2119:09. The large variation was also observed in previous PTs and in iis PT report (iis14C07) of 2014 two possible root causes are mentioned for this large variation. The first one: CO₂-absorption during the standing period of 1 hour and secondly: the use of Thymol Blue in stead of the sodium salt of Thymol Blue (and the need of caustic to dissolve the Thymol blue).

Appearance: Although not mentioned in the specification of Styrene; D2827:13, it is advised to use method ASTM E2680:09(2015) for the appearance determination, which is available since 2009. All participants agreed about the appearance of sample #15190 to be ‘clear and bright’ or ‘pass’. Participants who used ASTM E2680 should report the appearance as ‘pass’ or as ‘fail’ dependent on the appearance of the product. Nineteen participants reported the appearance as ‘pass’. The other laboratories used different kind of terms or abbreviations like: Clear and Free, Clear and Bright (C&B), Clear and free from suspended matter (CFFSM), Clear liquid free of sediment and haze at 20°C (CLFSH) or mentioned only Clear.

Chloride, Organic: The consensus value for Organic Chloride was below the application range of ASTM D5808:09a(2014) (1-25 mg/kg), therefore, no significant conclusions were drawn.

Colour Pt/Co: 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 D5386:10 and with ASTM D1209:05(2011).

- Density: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ISO 12185:96.
The current version of method ASTM D4052:11 gives only reproducibilities for the density range 0.71 g/ml to 0.88 g/ml, being valid for gasolines, distillates, basestocks and lubricating oils and thus this 2011 version may be not applicable for Styrene. Note: The previous 2002e1 version of ASTM D4052 reported also a reproducibility value of 0.0005 g/ml for a density range 0.68 – 0.97 g/ml which was applicable for Styrene.
- Inhibitor as TBC: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4590:13.
- Peroxides as H₂O₂: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D2340:13.
- Polymers: 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 D2121-A:15.
- Sulphur: The consensus value for Sulphur was below the application range of ASTM D5453:12 (1-8000 mg/kg), therefore, no significant conclusions were drawn.
- Water, coulometric KF titration: 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 requirement of ASTM E1064:12.
- Purity: 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 D5135:14.
- Benzene: Almost all participants reported a Benzene value “less than” and therefore no significant conclusions were drawn. However, it should be noted that the Styrene specification D2827:13 mentions a Benzene content of 1 mg/kg maximum and 10 participants reported ‘<10mg/kg’ which is not in accordance with the D2827 specification.
- Toluene: Almost all participants reported a Toluene value “less than” and therefore no significant conclusions were drawn.
- Ethylbenzene: 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 D5135:14.

m- & p-Xylenes: This determination may be not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated requirements using the Horwitz equation. However, the calculated reproducibility is not at all in agreement with the requirements of ASTM D5135:14. Remarkable is the significant difference between the Horwitz equation and reproducibility of the method. This has also been observed in PT iis14C07 Styrene of 2014. Therefore, it can be concluded that the reproducibility of the method probably can not be met in practice.

iso-Propylbenzene (Cumene): This determination may be problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the estimated requirements using the Horwitz equation. A possible root cause for this large variation can be that the consensus value for iso-Propylbenzene (Cumene) is close to the limit of detection. However, the calculated reproducibility is not at all in agreement with the requirements of ASTM D5135:14. Remarkable is the significant difference between the Horwitz equation and reproducibility of the method. This has also been observed in PT iis14C07 Styrene of 2014. Therefore, it can be concluded that the reproducibility of the method probably can not be met in practice.

o-Xylene: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5135:14.

n-Propylbenzene: The consensus value for n-Propylbenzene was below the application range of ASTM D5135:14 (10-10.000 mg/kg), therefore, no significant conclusions were drawn.

m- & p-Ethyltoluenes: The consensus value for m- & p-Ethyltoluenes was below the application range of ASTM D5135:14 (10-10.000 mg/kg), therefore, no significant conclusions were drawn.

α -Methylstyrene: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5135:14.

1,2-Diethylbenzene: Only five laboratories reported a test result for this component of which three participants reported "lower than ..". Therefore no statistical calculations have been performed.

Sum α -Methylstyrene & 1,2-Diethylbenzene: Only five laboratories reported a numerical test result for the sum of the two components. However this determination may not be problematic. No statistical conclusions could be drawn with respect to outlier analysis. The calculated reproducibility is in agreement with the estimated requirements using the Horwitz equation.

Phenylacetylene: The consensus value for Phenylacetylene was below the application range of ASTM D5135:14 (10-10.000 mg/kg), therefore, no significant conclusions were drawn.

3- & 4 -Methylstyrenes: Only four laboratories reported a test result as “lower than ...” for these components. No significant conclusions could be drawn.

Sum Phenylacetylene & 3- & 4 -Methylstyrenes: Only four laboratories reported test results for this determination, therefore, no significant conclusions could be drawn.

Benzaldehyde: This determination was problematic. No statistical outliers were observed. Two participants reported a Benzaldehyde content higher than total Aldehyde content determined by titration (see also discussion above at Total Aldehyde determination). The calculated reproducibility, after rejection of the suspected values, is not in agreement with the estimated requirements using the Horwitz equation.

Nonaromatics: The consensus value for Nonaromatics was below the application range of ASTM D5135:14 (10-10.000 mg/kg), therefore, no significant conclusions were drawn.

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 target reproducibilities derived from literature standards (in casu ASTM standards) and the calculated reproducibilities of sample #15190 are compared in the next table.

Parameter	unit	n	average	2.8 *sd _R	R (lit)
Aldehydes as benzaldehyde	mg/kg	25	96.2	69.6	38.5
Appearance		35	Pass	n.a.	n.a.
Chloride, Organic	mg/kg	16	≤ 1	n.a.	n.a.
Colour Pt/Co		34	7.4	3.6	5.7
Density at 20°C	kg/L	35	0.9063	0.0002	0.0005
Inhibitor as TBC	mg/kg	34	7.0	2.4	2.9
Peroxides as H ₂ O ₂	mg/kg	29	26.7	17.2	13.0
Polymers	mg/kg	16	0.7	1.1	3.0
Sulphur	mg/kg	29	≤ 1	n.a.	n.a.
Water, coulometric KF titration	mg/kg	34	122	34	44
Purity by GC	%M/M	31	99.92	0.02	0.03
Benzene	mg/kg	20	≤ 1	n.a.	n.a.
Toluene	mg/kg	24	<10	n.a.	n.a.
Ethylbenzene	mg/kg	31	370	60	106
m- & p-Xylenes	mg/kg	21	11.1	2.4	4.9
iso-Propylbenzene (Cumene)	mg/kg	18	6.0	2.5	2.1
o-Xylene	mg/kg	16	7.1	5.6	9.9
n-Propylbenzene	mg/kg	13	4.2	3.4	(1.0)
m- & p-Ethyltoluenes	mg/kg	10	5.0	3.0	(1.8)
α-Methylstyrene	mg/kg	28	253	45	108
1,2-Diethylbenzene	mg/kg	5	<10	n.a.	n.a.
sum α-Methylstyrene & 1,2-diethylbenzene	mg/kg	5	260	28	71
Phenylacetylene	mg/kg	25	<10	n.a.	n.a.
3- & 4-Methylstyrenes	mg/kg	4	<10	n.a.	n.a.
sum Phenylacetylene & 3- & 4-Methylstyrenes	mg/kg	4	<10	n.a.	n.a.
Benzaldehyde	mg/kg	13	66.1	27.5	15.8
Nonaromatics	mg/kg	13	<10	n.a.	n.a.

Table 3: comparison of the observed and target reproducibilities of sample #15190
Between brackets is near or below the detection limit of the test method

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF OCTOBER 2015 WITH PREVIOUS PTS

	October 2015	September 2014	September 2013	September 2012	October 2011
Number of reporting labs	37	36	34	38	31
Number of Results reported	447	510	474	552	403
Statistical outliers	20	33	29	30	15
Percentage outliers	4.5%	6.5%	6.1%	5.4%	3.7%

Table 4: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared against the requirements of the respective standards. The conclusions are given in the following table:

Determination	October 2015	September 2014	September 2013	September 2012	October 2011
Aldehydes	--	--	--	--	--
Chloride, organic	n.e.	+	+/-	++	n.e.
Colour Pt/Co	++	++	++	+	++
Density at 20°C	++	++	++	++	++
Inhibitor as TBC	+	--	--	+	-
Peroxides as H ₂ O ₂	-	--	--	--	--
Polymers	++	--	--	--	+/-
Sulphur	n.e.	+	++	+	n.e.
Water, coulometric KF titration	+	++	--	--	--
Purity by GC	+	(--)	++	+/-	+
Benzene	n.e.	--	--	--	n.e.
Toluene	n.e.	--	n.e.	n.e.	n.e.
Ethylbenzene	++	++	++	+/-	++
m- & p-Xylenes	++	++	--	--	--
iso-Propylbenzene (Cumene)	-	--	n.e.	+	--
o-Xylene	++	--	++	++	++
n-Propylbenzene	(--)	--	+	n.e.	-
m- & p-Ethyltoluenes	(-)	++	n.e.	n.e.	n.e.
α-Methylstyrene	++	--	--	-	--
1,2-Diethylbenzene	n.e.	(--)	n.e.	n.e.	n.e.
sum α-Methylstyrene & 1,2-diethylbenzene	++	n.e.	n.e.	n.e.	n.e.
Phenylacetylene	n.e.	--	--	(--)	--
3- & 4-Methylstyrenes	n.e.	n.e.	--	n.e.	n.e.
sum Phenylacetylene & 3- & 4-Methylstyrenes	n.e.	n.e.	n.e.	n.e.	n.e.
Benzaldehyde	-	--	--	--	--
Nonaromatics	n.e.	--	n.e.	n.e.	--

Table 5: comparison of overall performance per parameter against the standard requirements

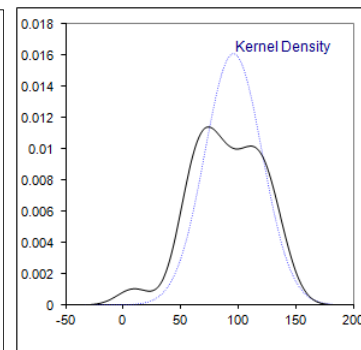
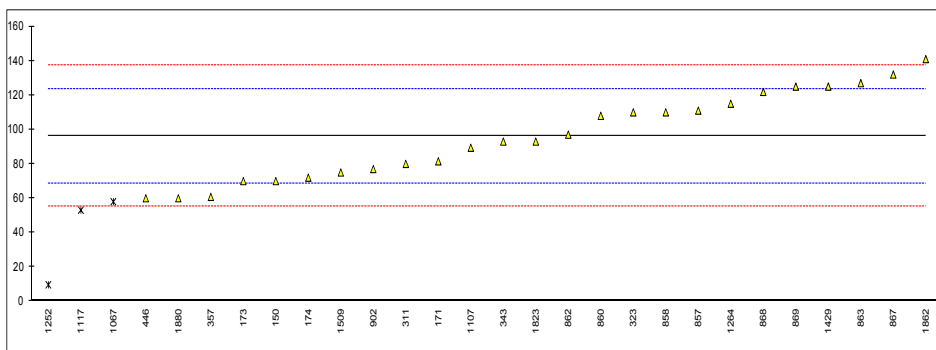
The performance of the determinations against the requirements of the respective standards is listed in the above table. The following performance categories were used:

- ++: 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 Aldehydes as benzaldehyde on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D2119	70		-1.91	
171	D2119	81.5	C	-1.07	first reported: 0.0815 mg/kg
173	D2119	70		-1.91	
174	D2119	72		-1.76	
273		----		----	
311	D2119	80		-1.18	
323	D2119	110		1.01	
333		----		----	
343	D2119	93	C	-0.23	first reported: 199
347		----		----	
357	D2119	60.8		-2.58	
446	D2119	60		-2.63	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D2119	111		1.08	
858	D2119	110		1.01	
860	D2119	108		0.86	
862	D2119	97		0.06	
863	D2119	127		2.24	
867	D2119	132		2.61	
868	D2119	121.9		1.87	
869	D2119	125		2.10	
902	D2119	77		-1.40	
913		----		----	
1067	D2119	58	ex	-2.78	note: lower than Benzaldehyde by GC, see §4.1
1107	D2119	89.4		-0.49	
1117	D2119	53.1	ex, C	-3.14	fr: 37.1 D7704; note: lower than Benzaldehyde by GC, see §4.1
1201		----		----	
1252	D2119	9.62	R(0.05)	-6.30	
1264	D2119	115		1.37	
1429	D2119	125		2.10	
1509	D2119	75		-1.54	
1515		----		----	
1823	D2119	93		-0.23	
1862	D2119	141		3.26	
1866		----		----	
1880	D2119	60.0		-2.63	
7014		----		----	
9008		----		----	
normality		OK			
n		25			
outliers		1+2ex			
mean (n)		96.18			
st.dev. (n)		24.871			
R(calc.)		69.64			
R(D2119:09)		38.47			



Determination of Appearance on sample #15190;

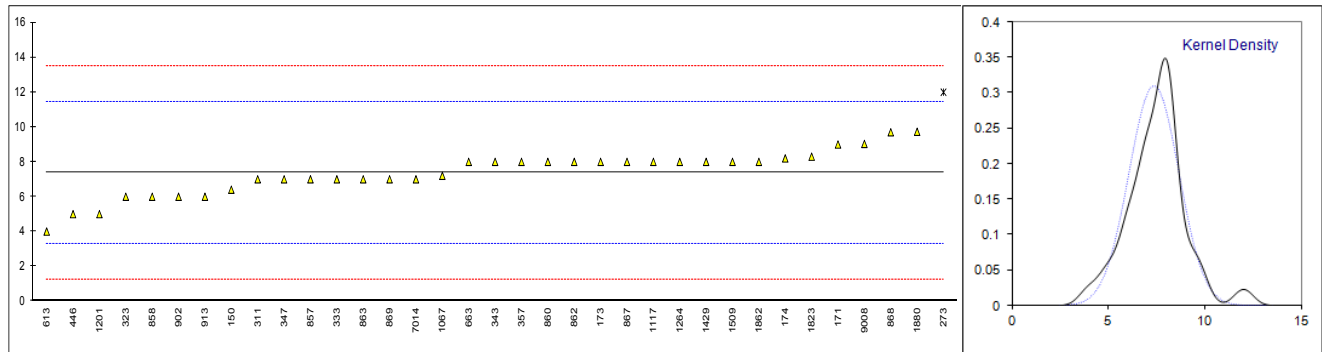
lab	method	value	z(targ)	remarks
150	E2680	Pass	----	
171	E2680	Clear and Free	----	
173	D4176	Pass	----	
174	E2680	PASS	----	
273	Visual	Clear & Bright	----	
311	E2680	pass	----	
323	Visual	CBL	----	
333		n	----	
343	E2680	Pass	----	
347	E2680	Pass	----	
357	E2680	Pass	----	
446	E2680	Pass	----	
551		n	----	
557		n	----	
613	E2680	Pass	----	
663	Visual	Bright and Clear	----	
857	Visual	Clear and free of suspended matter	----	
858	E2680	Pass	----	
860	E2680	Pass	----	
862	Visual	Bright & Clear	----	
863	E2680	Pass	----	
867	Visual	Bright&Clear	----	
868	E2680	Pass	----	
869	Visual	Clear and bright	----	
902	E2680	PASS	----	
913	Visual	Pass	----	
1067	E2680	Pass	----	
1107	Visual	clear	----	
1117	D4176	pass	----	
1201	Visual	Clear liquid free of sediment and haze at 20°C	----	
1252		n	----	
1264	Visual	CLEAR	----	
1429	E2680	C&B	----	
1509	E2680	Clear & Free from Suspended Matters	----	
1515		n	----	
1823	D4176	Clear/FFSM/No free water	----	
1862	Visual	Cl&Br	----	
1866		n	----	
1880	E2680	Pass	----	
7014	in house	CLFSH	----	
9008	E2680	Pass	----	
	n	35		
	mean(n)	Pass		
		19 reported Pass		
		8 reported Clear and Bright		
		2 reported Clear		
		6 reported various descriptions indicating that the liquid is clear and free of suspended matter		

Determination of Chloride, Organic on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D7359	<1.0		----	
171	D5808	0.260		----	
173		----		----	
174		----		----	
273		----		----	
311	D5808	<1		----	
323	D5808	<1		----	
333	D5808	<1		----	
343	in house	<10		----	
347	D5808	<1		----	
357	D5808	<1		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663	D5808	<1		----	
857		----		----	
858		----		----	
860	D5808	<1		----	
862	D5808	<1		----	
863		----		----	
867		----		----	
868	D5808	<1		----	
869		----		----	
902		----		----	
913		----		----	
1067		----		----	
1107		----		----	
1117		----		----	
1201	D5808	0		----	
1252		----		----	
1264		----		----	
1429	D7359	<0.5		----	
1509	D5808	0.06		----	
1515		----		----	
1823		----		----	
1862		----		----	
1866		----		----	
1880	D5808	<0.1		----	
7014		----		----	
9008	D5808	<0.1		----	
	normality	n.a.			
	n	16			
	outliers	n.a.			
	mean (n)	≤1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D5808:09a)	n.a.			

Determination of Colour Pt/Co on sample #15190;

lab	method	value	mark	z(targ)	Remarks
150	D5386	6.4		-0.47	
171	D5386	9.0		0.80	
173	D5386	8		0.31	
174	D5386	8.2		0.41	
273	D1209	12	R(0.05)	2.26	
311	D5386	7		-0.18	
323	D5386	6		-0.67	
333	D5386	7		-0.18	
343	D5386	8		0.31	
347	D5386	7		-0.18	
357	D5386	8		0.31	
446	D5386	5		-1.16	
551		----		----	
557		----		----	
613	D1209	4		-1.64	
663	D5386	8		0.31	
857	D5386	7		-0.18	
858	D5386	6		-0.67	
860	D5386	8		0.31	
862	D5386	8		0.31	
863	D1209	7		-0.18	
867	D1209	8		0.31	
868	D1209	9.7		1.14	
869	D1209	7		-0.18	
902	D5386	6		-0.67	
913	D5386	6		-0.67	
1067	D5386	7.2		-0.08	
1107		----		----	
1117	D1209	8		0.31	
1201	D1209	5		-1.16	
1252	D1209	<5		<-1.16	
1264	D1209	8		0.31	
1429	D1209	8		0.31	
1509	D5386	8		0.31	
1515		----		----	
1823	D1209	8.3		0.45	
1862	D1209	8		0.31	
1866		----		----	
1880	D5386	9.73		1.15	
7014	D1209	7		-0.18	
9008	D5386	9.03		0.81	
normality		OK			
n		34			
outliers		1			
mean (n)		7.37			
st.dev. (n)		1.288			
R(calc.)		3.61			
R(D5386:10)		5.74			
				Compare R(D1209:05)=7	

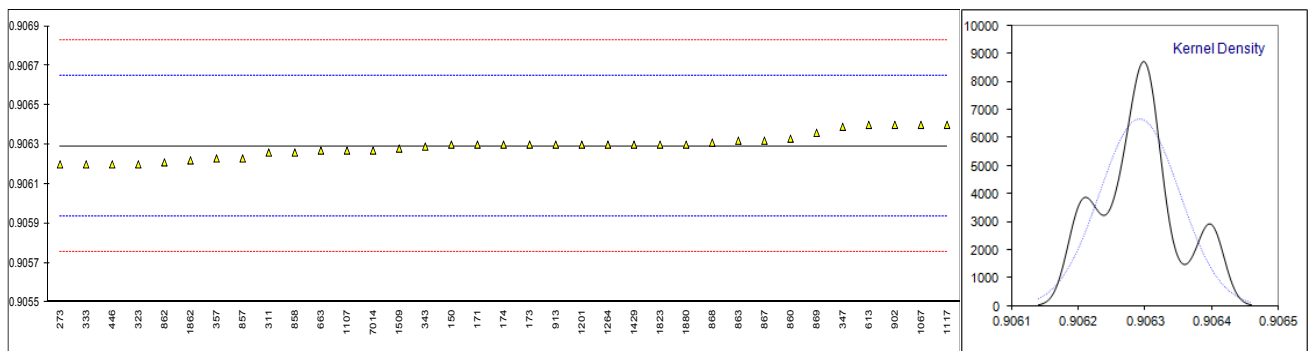


Determination of Density at 20°C on sample #15190; results in kg/L

lab	method	value	mark	z(targ)	remarks
150	ISO12185	0.9063		0.05	
171	D4052	0.9063		0.05	
173	D4052	0.9063		0.05	
174	D4052	0.9063		0.05	
273	D4052	0.9062		-0.51	
311	D4052	0.90626		-0.18	
323	D4052	0.9062		-0.51	
333	ISO12185	0.9062		-0.51	
343	ISO12185	0.90629		-0.01	
347	D4052	0.90639		0.55	
357	D4052	0.90623		-0.35	
446	D4052	0.9062		-0.51	
551		----		----	
557		----		----	
613	D4052	0.9064	C	0.61	first reported: 906.40
663	D4052	0.90627		-0.12	
857	D4052	0.90623		-0.35	
858	D4052	0.90626		-0.18	
860	D4052	0.90633		0.21	
862	D4052	0.90621		-0.46	
863	D4052	0.90632		0.16	
867	D4052	0.90632		0.16	
868	D4052	0.90631		0.10	
869	D4052	0.90636		0.38	
902	D4052	0.9064		0.61	
913	D4052	0.9063		0.05	
1067	D4052	0.9064		0.61	
1107	D4052	0.90627		-0.12	
1117	D4052	0.9064		0.61	
1201	D4052	0.9063		0.05	
1252		----		----	
1264	D4052	0.9063		0.05	
1429	D4052	0.9063		0.05	
1509	D4052	0.90628		-0.07	
1515		----		----	
1823	D4052	0.9063		0.05	
1862	ISO12185	0.90622		-0.40	
1866		----		----	
1880	D4052	0.90630		0.05	
7014	D4052	0.90627		-0.12	
9008		----		----	

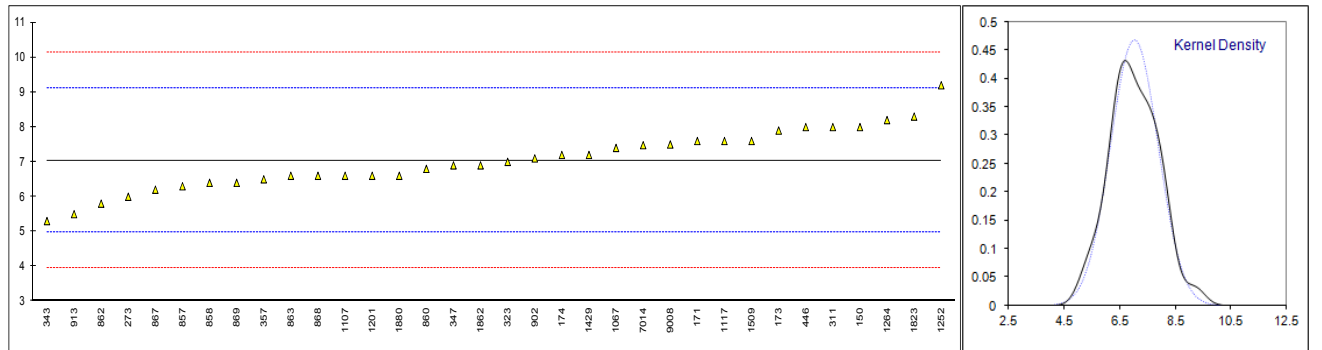
normality OK
n 35
outliers 0
mean (n) 0.906292
st.dev. (n) 0.0000599
R(calc.) 0.000168
R(ISO12185:96) 0.000500

Compare R (D4052:02e1)=0.000500



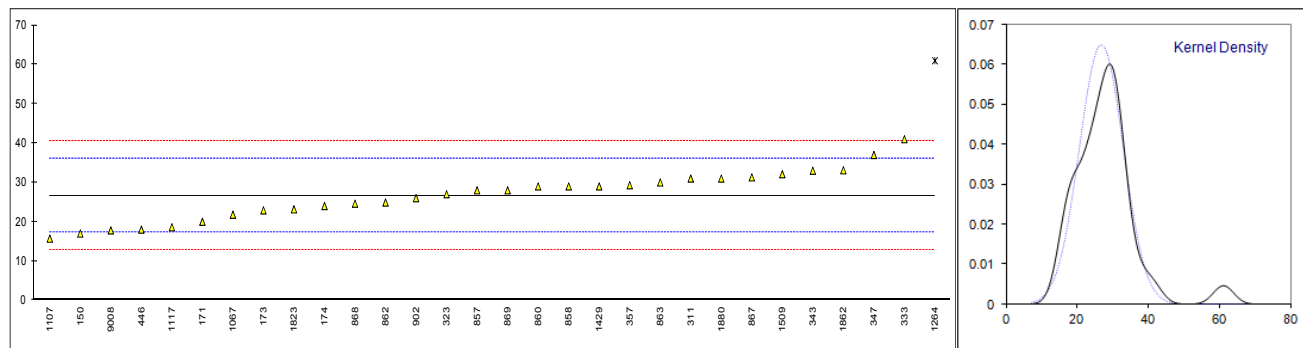
Determination of Inhibitor as TBC on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D4590	8		0.93	
171	D4590	7.6		0.54	
173	D4590	7.9		0.83	
174	D4590	7.2		0.16	
273	D4590	6	C	-1.00	first reported: 4.17
311	D4590	8		0.93	
323	D4590	7		-0.04	
333	D4590	<1		<-5.84	false negative test result?
343	D4590	5.3		-1.68	reported error on QC
347	D4590	6.9	C	-0.13	first reported: 5.2
357	D4590	6.5		-0.52	
446	D4590	8		0.93	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D4590	6.3		-0.71	
858	D4590	6.4		-0.62	
860	D4590	6.8		-0.23	
862	D4590	5.8		-1.20	
863	D4590	6.6		-0.42	
867	D4590	6.2		-0.81	
868	D4590	6.6		-0.42	
869	D4590	6.4		-0.62	
902	D4590	7.1		0.06	
913	D4590	5.5		-1.49	
1067	D4590	7.4		0.35	
1107	D4590	6.6		-0.42	
1117	D4590	7.6		0.54	
1201	D4590	6.6		-0.42	
1252	D4590	9.20		2.09	
1264	D4590	8.20		1.12	
1429	D4590	7.2	C	0.16	first reported: 4.2
1509	D4590	7.6		0.54	
1515		----		----	
1823	D4590	8.3		1.22	
1862	D4590	6.9	C	-0.13	first reported: 6.0
1866		----		----	
1880	D4590	6.6		-0.42	
7014	D4590	7.48		0.43	
9008	in house	7.5		0.45	
normality		OK			
n		34			
outliers		0			
mean (n)		7.038			
st.dev. (n)		0.8543			
R(calc.)		2.392			
R(D4590:13)		2.894			



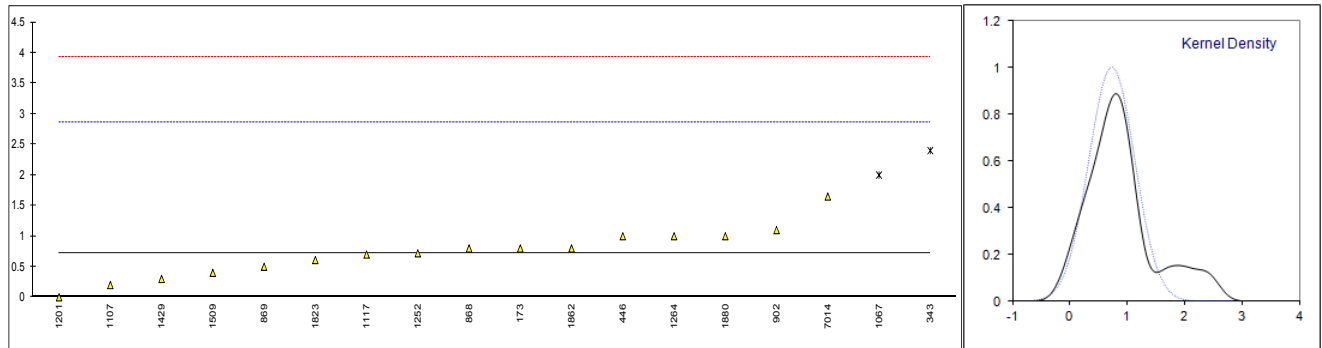
Determination of Peroxides as H₂O₂ on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D2340	17		-2.08	
171	D2340	20.0		-1.44	
173	D2340	22.9		-0.81	
174	D2340	24		-0.57	
273		----		----	
311	D2340	31	C	0.93	first reported: 46
323	D2340	27		0.07	
333	D2340	41		3.09	
343	D2340	33		1.36	
347	D2340	37		2.23	
357	D2340	29.3		0.57	
446	D2340	18		-1.87	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D2340	28		0.29	
858	D2340	29		0.50	
860	D2340	29		0.50	
862	D2340	24.9		-0.38	
863	D2340	30		0.72	
867	D2340	31.3		1.00	
868	D2340	24.6		-0.44	
869	D2340	28.0		0.29	
902	D2340	26		-0.14	
913		----		----	
1067	D2340	21.8	C	-1.05	first reported: 8.0
1107	D2340	15.7		-2.36	
1117	D2340	18.6		-1.74	
1201		----		----	
1252		----		----	
1264	D2340	61	R(0.01)	7.40	
1429	D2340	29		0.50	
1509	D2340	32.1		1.17	
1515		----		----	
1823	D2340	23.16		-0.75	
1862	D2340	33.1		1.39	
1866		----		----	
1880	D2340	31.0		0.93	
7014		----		----	
9008	D2340	17.8		-1.91	
normality		OK			
n		29			
outliers		1			
mean (n)		26.66			
st.dev. (n)		6.160			
R(calc.)		17.25			
R(D2340:13)		13.00			



Determination of Polymers on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D2121	<1		----	
171		----		----	
173	D2121	0.8		0.07	
174	D2121	<1		----	
273		----		----	
311	D2121	<1		----	
323	D2121	<1		----	
333	D2121	<1		----	
343	D2121	2.4	DG(0.05)	1.57	
347	in house	<1		----	
357	D2121	<1		----	
446	D2121	1		0.26	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D2121	<1		----	
858	D2121	<1		----	
860	D2121	<1		----	
862	D2121	<1		----	
863	D2121	<1		----	
867	D2121	<1		----	
868	D2121	0.8		0.07	
869	D2121	0.5		-0.21	
902	D2121	1.1		0.35	
913	D2121	<1.0		----	
1067	D2121	2.0	DG(0.05)	1.19	
1107	D2121	0.2		-0.49	
1117	D2121	0.7		-0.02	
1201	D2121	0		-0.68	
1252	D2121	0.72		0.00	
1264	D2121	1.0		0.26	
1429	D2121	0.3		-0.40	
1509	D2121	0.4		-0.30	
1515		----		----	
1823	D2121	0.61		-0.11	
1862	D2121	0.8		0.07	
1866		----		----	
1880	D2121	1.0		0.26	
7014	D2121	1.65		0.87	
9008		----		----	
normality		OK			
n		16			
outliers		2			
mean (n)		0.72			
st.dev. (n)		0.399			
R(calc.)		1.12			
R(D2121-A:15)		2.99			

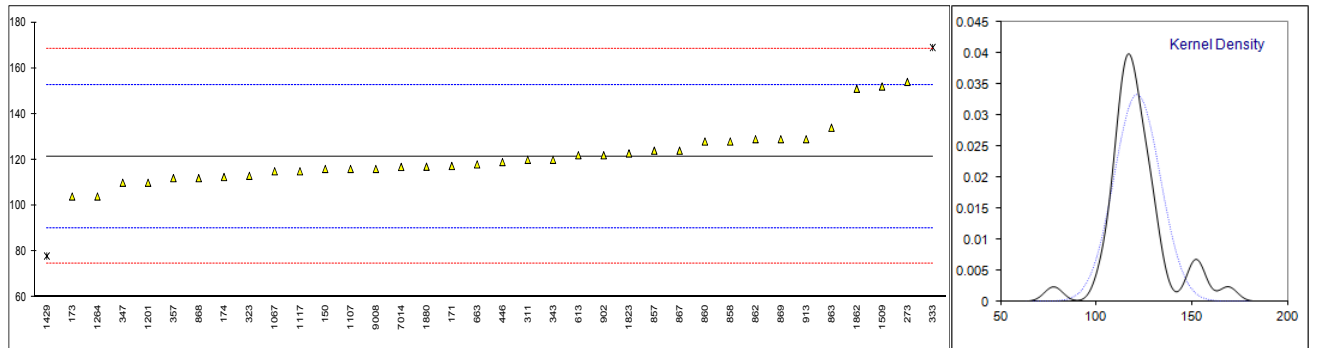


Determination of Sulphur on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5453	<1.0		----	
171	D5453	0.09		----	
173	D5453	<1	C	----	first reported: 0.4
174	D5453	<1		----	
273	D5453	1	C	----	first reported: 0.5
311	D5453	<1		----	
323	D5453	<1		----	
333	D5453	<0.5		----	
343	D5453	<1		----	
347	D5453	<1		----	
357	D5453	<1		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663	D5453	0.11		----	
857	D3120	<1		----	
858		----		----	
860	D3120	<1		----	
862	D5453	<1		----	
863	D5453	0.1		----	
867		----		----	
868	D5453	<1		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5453	0.3		----	
1107		----		----	
1117	D5453	0.1		----	
1201	D5453	0.1		----	
1252	D5623	<1		----	
1264	D5453	0.6		----	
1429	ISO20846	<1	C	----	first reported: 0.6
1509	D5453	0.13		----	
1515		----		----	
1823	D5453	0.14		----	
1862	ISO20846	0.12		----	
1866		----		----	
1880	D5453	<0.1		----	
7014	D5453	0.13		----	
9008	D5453	<0.1		----	
	normality	n.a.			Application range: 1 – 8000
	n	29			
	outliers	n.a.			
	mean (n)	≤1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D5453:12)	n.a.			

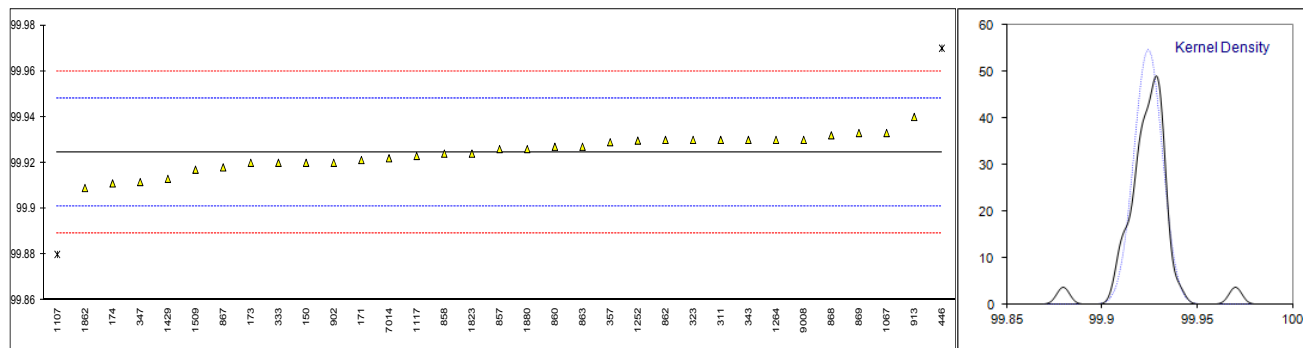
Determination of Water, coulometric KF titration on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	E1064	116		-0.35	
171	E1064	117.3		-0.27	
173	D6304	104		-1.12	
174	E1064	112.5		-0.58	
273	E1064	154	C	2.08	first reported: 173
311	E1064	120		-0.10	
323	E1064	113		-0.55	
333	E1064	169	R(0.05)	3.04	
343	E1064	120		-0.10	
347	E1064	110		-0.74	
357	E1064	112		-0.61	
446	E1064	119		-0.16	
551		----		----	
557		----		----	
613	E203	122		0.03	
663	E1064	118		-0.23	
857	E1064	124		0.16	
858	E1064	128		0.41	
860	E1064	128		0.41	
862	E1064	129		0.48	
863	E1064	134		0.80	
867	E1064	124		0.16	
868	E1064	112		-0.61	
869	E1064	129		0.48	
902	E1064	122		0.03	
913	E1064	129		0.48	
1067	E1064	115		-0.42	
1107	E1064	116		-0.35	
1117	E1064	115		-0.42	
1201	E1064	110		-0.74	
1252		----		----	
1264	E1064	104		-1.12	
1429	D1364	78	R(0.05)	-2.79	
1509	E1064	152		1.95	
1515		----		----	
1823	E1064	122.8		0.08	
1862	E1064	151		1.89	
1866		----		----	
1880	E1064	117.0		-0.29	
7014	D6304	116.9		-0.30	
9008	E1064	116		-0.35	
normality		not OK			
n		34			
outliers		2			
mean (n)		121.54			
st.dev. (n)		11.996			
R(calc.)		33.59			
R(E1064:12)		43.73			



Determination of Purity by GC on sample #15190; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D5135	99.92		-0.37	
171	D5135	99.9212		-0.27	
173	D5135	99.92		-0.37	
174	D5135	99.911		-1.14	
273		----		----	
311	D5135	99.93		0.48	
323	D5135	99.93		0.48	
333	D5135	99.92		-0.37	
343	D5135	99.93		0.48	
347	D5135	99.9116		-1.09	
357	D5135	99.929		0.39	
446	D5135	99.97	R(0.01)	3.87	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	99.926		0.14	
858	D5135	99.924		-0.03	
860	D5135	99.927		0.22	
862	D5135	99.93		0.48	
863	D5135	99.927		0.22	
867	D5135	99.918		-0.54	
868	D5135	99.932		0.65	
869	D5135	99.933		0.73	
902	D5135	99.92		-0.37	
913	D5135	99.94		1.33	
1067	D5135	99.933		0.73	
1107	in house	99.88	R(0.01)	-3.77	
1117	D5135	99.923		-0.12	
1201		----		----	
1252	D5135	99.9297		0.45	
1264	D5135	99.93		0.48	
1429	D5135	99.913		-0.97	
1509	D5135	99.917		-0.63	
1515		----		----	
1823	D5135	99.924		-0.03	
1862	D5135	99.909		-1.31	
1866		----		----	
1880	D5135	99.926		0.14	
7014	D5135	99.922		-0.20	
9008	D5135	99.93		0.48	
normality	OK				
n	31				
outliers	2				
mean (n)	99.9244				
st.dev. (n)	0.00732				
R(calc.)	0.0205				
R(D5135:14)	0.0330				



Determination of Benzene on sample #15190; results in mg/kg

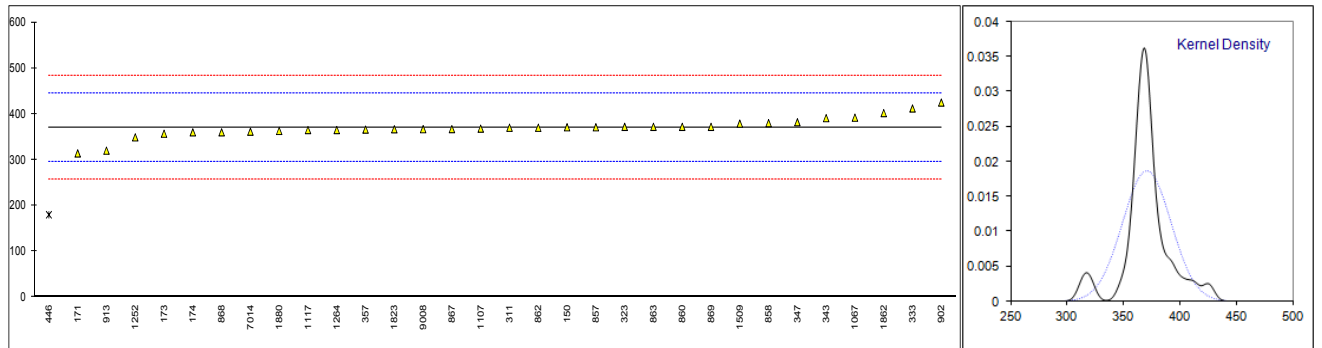
lab	method	value	mark	z(targ)	remarks
150	D5135	<10		----	
171	D5135	0.0		----	
173	D7504	<1		----	
174	D5135	<10		----	
273		----		----	
311	D6229	<1		----	
323	in house	<1		----	
333		----		----	
343	in house	<1		----	
347	in house	<1		----	
357	D5135	<1		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858	D5135	<10		----	
860	D5135	<10		----	
862	D5135	<1		----	
863	D5135	<10		----	
867	D5135	<10		----	
868	D5135	<10		----	
869	D5135	<10		----	
902	in house	<1		----	
913	D5135	<10		----	
1067	D5135	n.d.		----	
1107	in house	1		----	
1117	in house	0.2		----	
1201	D5135	<0.1		----	
1252	D5135	<0.20		----	
1264	D5135	1.0		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 122
1509	in house	<0.5		----	
1515		----		----	
1823		<0.5		----	
1862		1.4		----	false positive test result?
1866		----		----	
1880		<1		----	
7014	D5135	<0.5		----	
9008	D5135	<1		----	
	normality	n.a.			
	n	19			Application range: 1 – 2400 ppmv
	outliers	n.a.			
	mean (n)	≤1			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D6229:06)	n.a.			

Determination of Toluene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	<10		----	
171	D5135	0		----	
173	D7504	<1		----	
174	D5135	<10		----	
273		----		----	
311	D5135	<1		----	
323	in house	<1		----	
333		----		----	
343		----		----	
347	in house	<1		----	
357		----		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	<10		----	
858	D5135	<10		----	
860	D5135	<10		----	
862	D5135	<1		----	
863	D5135	<10		----	
867	D5135	<10		----	
868	D5135	<10		----	
869		----		----	
902		----		----	
913	D5135	<10		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	3.7		----	
1201		----		----	
1252		----		----	
1264	D5135	<1		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 17
1509	D5135	<5		----	
1515		----		----	
1823	D5135	n.d.		----	
1862	D5135	<10		----	
1866		----		----	
1880		----		----	
7014	D5135	<0.5		----	
9008	D5135	<1		----	
	normality	n.a.			
	n	24			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

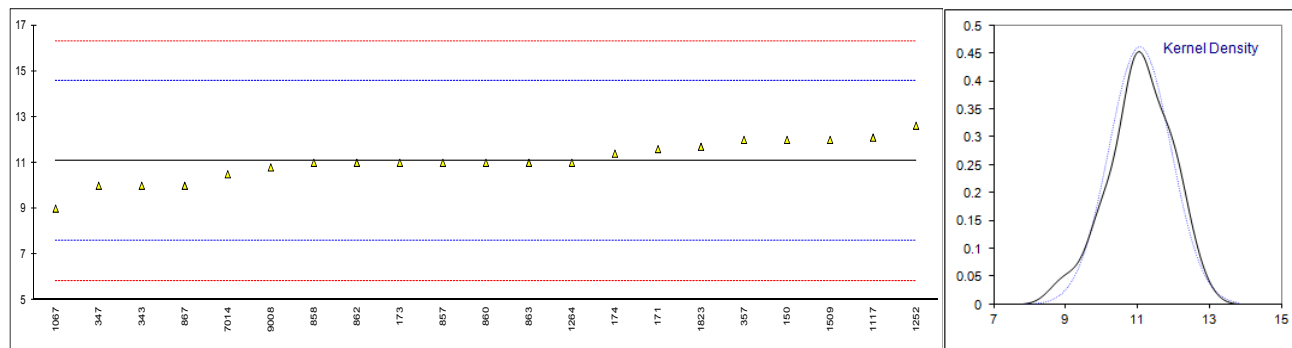
Determination of Ethylbenzene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	371		0.02	
171	D5135	314		-1.49	
173	D5135	357		-0.35	
174	D5135	360		-0.27	
273		----		----	
311	D5135	370		-0.01	
323	D5135	372		0.04	
333	D5135	412		1.10	
343	D5135	391		0.55	
347	D5135	382		0.31	
357	D5135	366		-0.12	
446	D5135	180	R(0.01)	-5.04	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	371		0.02	
858	D5135	380		0.25	
860	D5135	372		0.04	
862	D5135	370		-0.01	
863	D5135	372		0.04	
867	D5135	367		-0.09	
868	D5135	360		-0.27	
869	D5135	372		0.04	
902	D5135	425		1.45	
913	D5135	320		-1.33	
1067	D5135	392		0.57	
1107	in house	368		-0.06	
1117	D5135	364.9		-0.15	
1201		----		----	
1252	D5135	349.02		-0.57	
1264	D5135	365		-0.14	
1429		----	W	----	result withdrawn, see §4.1, reported: 373
1509	D5135	379		0.23	
1515		----		----	
1823	D5135	366.7		-0.10	
1862	D5135	402		0.84	
1866		----		----	
1880	D5135	363		-0.20	
7014	D5135	361.4		-0.24	
9008	D5135	366.9		-0.09	
normality		not OK			
n		31			
outliers		1			
mean (n)		370.38			
st.dev. (n)		21.405			
R(calc.)		59.93			
R(D5135:14)		105.82			compare R(Horwitz)=68.12



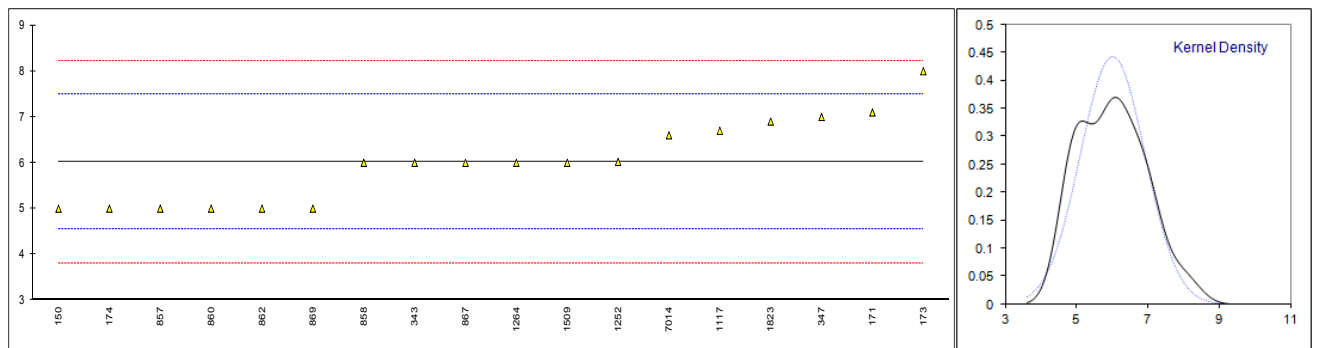
Determination of m- & p-Xylenes on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	12		0.53	
171	D5135	11.6	C	0.30	first reported: 7.3
173	D5135	11		-0.05	
174	D5135	11.4		0.18	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343	D5135	10	C	-0.62	first reported: 9
347	D5135	10		-0.62	
357	D5135	12		0.53	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	11		-0.05	
858	D5135	11		-0.05	
860	D5135	11		-0.05	
862	D5135	11		-0.05	
863	D5135	11		-0.05	
867	D5135	10		-0.62	
868	D5135	<10		----	
869		----		----	
902		----		----	
913	D5135	<10		----	
1067	D5135	9		-1.19	reported d.l. is < 20
1107		----		----	
1117	D5135	12.1		0.58	
1201		----		----	
1252	D5135	12.62		0.88	reported: 4.6 for p-Xylenes and 8.02 for m-Xylenes
1264	D5135	11		-0.05	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	12		0.53	
1515		----		----	
1823	D5135	11.7		0.35	
1862	D5135	<10	C	----	first reported: 12.8
1866		----		----	
1880	D5135	<10		----	
7014	D5135	10.5		-0.33	
9008	D5135	10.8		-0.16	
normality		OK			
n		21			
outliers		0			
mean (n)		11.082			
st.dev. (n)		0.8658			
R(calc.)		2.424			
R(Horwitz)		4.888			compare R(D5135:14)=0.620



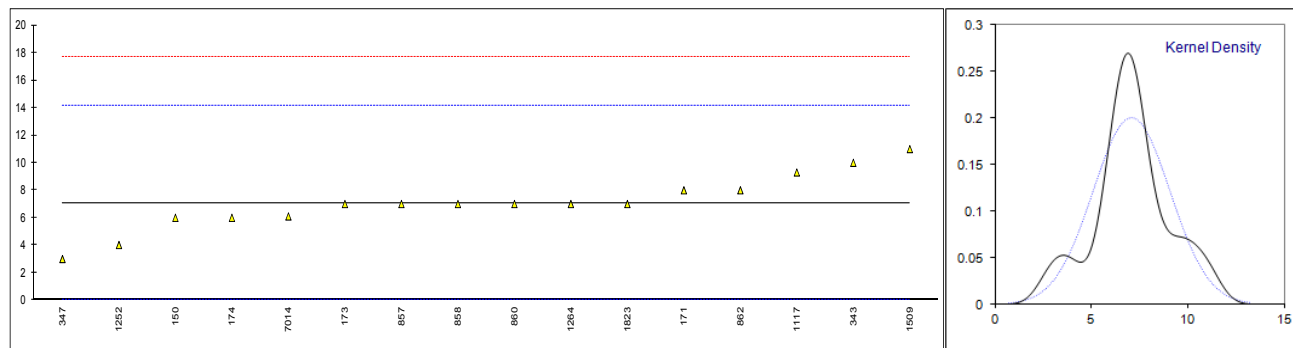
Determination of iso-Propylbenzene (Cumene) on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	5		-1.38	
171	D5135	7.1		1.47	
173	D5135	8		2.70	
174	D5135	5		-1.38	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343	D5135	6		-0.02	
347	D5135	7		1.34	
357	D5135	<10		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	5		-1.38	
858	D5135	6		-0.02	
860	D5135	5		-1.38	
862	D5135	5		-1.38	
863	D5135	<10		----	
867	D5135	6		-0.02	
868	D5135	<10		----	
869	D5135	5		-1.38	
902		----		----	
913	D5135	<10		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	6.7		0.93	
1201		----		----	
1252	D5135	6.02		0.00	
1264	D5135	6		-0.02	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	6		-0.02	
1515		----		----	
1823	D5135	6.9		1.20	
1862	D5135	<10		----	
1866		----		----	
1880	D5135	<10		----	
7014	D5135	6.6		0.79	
9008	D5135	<10		----	
normality		OK			
n		18			
outliers		0			
mean (n)		6.018			
st.dev. (n)		0.9031			
R(calc.)		2.529			
R(Horwitz)		2.058			compare R(D5135:14) = 0.752



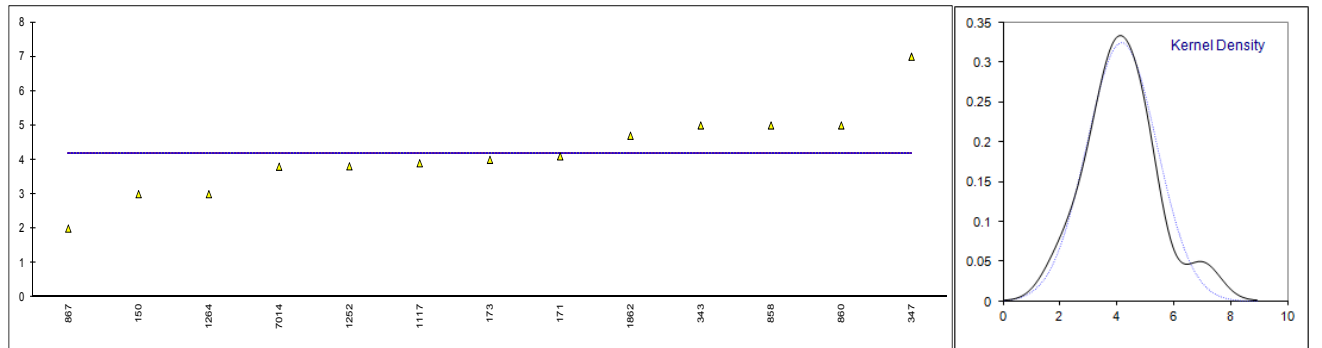
Determination of o-Xylene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	6		-0.31	
171	D5135	8.0		0.26	
173	D5135	7		-0.03	
174	D5135	6		-0.31	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343	D5135	10		0.82	
347	D5135	3		-1.15	
357	D5135	<10		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	7		-0.03	
858	D5135	7		-0.03	
860	D5135	7		-0.03	
862	D5135	8		0.26	
863	D5135	<10		----	
867	D5135	<10		----	
868	D5135	<10		----	
869		----		----	
902		----		----	
913	D5135	<10		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	9.3		0.62	
1201		----		----	
1252	D5135	4.02		-0.87	
1264	D5135	7		-0.03	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	11		1.10	
1515		----		----	
1823	D5135	7.0		-0.03	
1862	D5135	<10	C	----	first reported:15.8
1866		----		----	
1880	D5135	<10		----	
7014	D5135	6.1		-0.28	
9008	D5135	<10		----	
	normality	OK			
	n	16			
	outliers	0			
	mean (n)	7.09			
	st.dev. (n)	1.998			
	R(calc.)	5.59			
	R(D5135:14)	9.92			compare R(Horwitz)=2.36



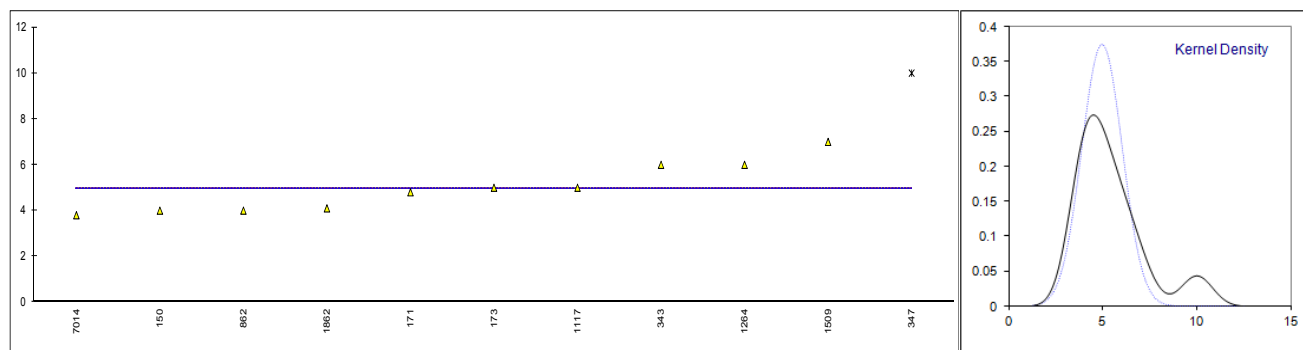
Determination of n-Propylbenzene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	3		----	
171	D5135	4.1		----	
173	D5135	4		----	
174	D5135	<10		----	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343	D5135	5		----	
347	D5135	7		----	
357	D5135	<10		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	<10		----	
858	D5135	5		----	
860	D5135	5		----	
862	D5135	<10		----	
863	D5135	<10		----	
867	D5135	2		----	
868	D5135	<10		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	3.9		----	
1201		----		----	
1252	D5135	3.81		----	
1264	D5135	3		----	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	<5		----	
1515		----		----	
1823		----		----	
1862	D5135	4.7		----	
1866		----		----	
1880	D5135	<10		----	
7014	D5135	3.8		----	
9008	D5135	<10		----	
normality		n.a.			Application range: 10 mg/kg – 1%M/M
n		13			
outliers		0			
mean (n)		4.18			
st.dev. (n)		1.231			
R(calc.)		3.44			
R(D5135:14)		(1.04)			Compare R(Horwitz)= 1.51



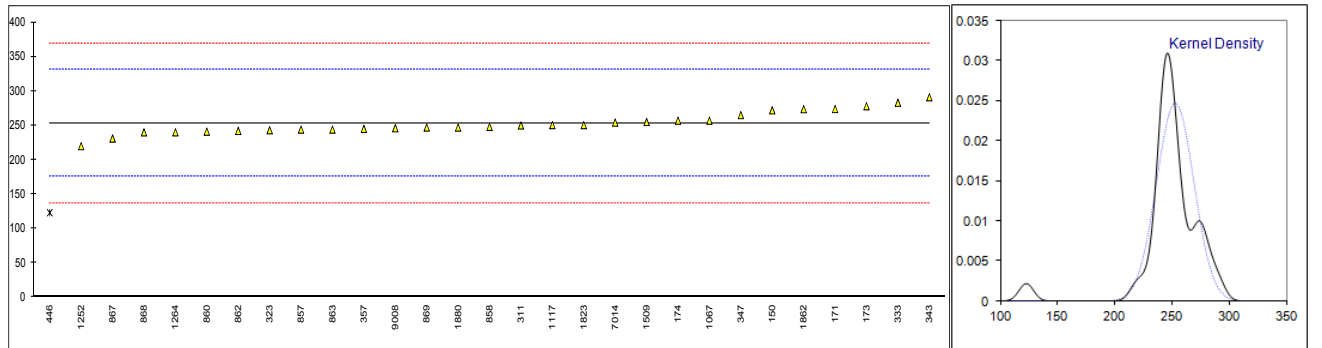
Determination of m- & p-Ethyltoluenes on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	4		----	
171	D5135	4.8		----	
173	D5135	5		----	
174	D5135	<10		----	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343	D5135	6		----	
347	D5135	10		----	
357	D5135	<10		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860	D5135	<10		----	
862	D5135	4		----	
863	D5135	<10		----	
867	D5135	<10		----	
868	D5135	<10		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	5.0		----	
1201		----		----	
1252		----		----	
1264	D5135	6		----	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	7		----	
1515		----		----	
1823		----		----	
1862	D5135	4.1		----	
1866		----		----	
1880		----		----	
7014	D5135	3.8		----	
9008	D5135	<10		----	
normality		n.a.			Application range:10 mg/kg – 1%M/M
n		10			
outliers		1			
mean (n)		4.97			
st.dev. (n)		1.069			
R(calc.)		2.99			
D5135:14		(1.78)			Compare R(Horwitz) =2.47



Determination of α -Methylstyrene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	272		0.49	
171	D5135	273.9		0.54	
173	D5135	278		0.64	
174	D5135	257		0.10	
273		----		----	
311	D5135	250		-0.08	
323	D5135	243		-0.26	
333	D5135	283		0.77	
343	D5135	291		0.98	
347	D5135	265		0.31	
357	D5135	245		-0.21	
446	D5135	123	R(0.01)	-3.36	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	244		-0.24	
858	D5135	248		-0.13	
860	D5135	241		-0.31	
862	D5135	242		-0.29	
863	D5135	244		-0.24	
867	D5135	231		-0.57	
868	D5135	240		-0.34	
869	D5135	247		-0.16	
902		----		----	
913		----		----	
1067	D5135	257	C	0.10	first reported: 194
1107		----		----	
1117	D5135	250.5		-0.07	
1201		----		----	
1252	D5135	219.84		-0.86	
1264	D5135	240		-0.34	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	D5135	255		0.05	
1515		----		----	
1823	D5135	250.5		-0.07	
1862	D5135	273.7		0.53	
1866		----		----	
1880	D5135	247		-0.16	
7014	D5135	254.1		0.02	
9008	D5135	246		-0.18	
normality		OK			
n		28			
outliers		1			
mean (n)		253.162			
st.dev. (n)		16.1656			
R(calc.)		45.264			
R(D5135:14)		108.498			compare R(Horwitz)=49.309

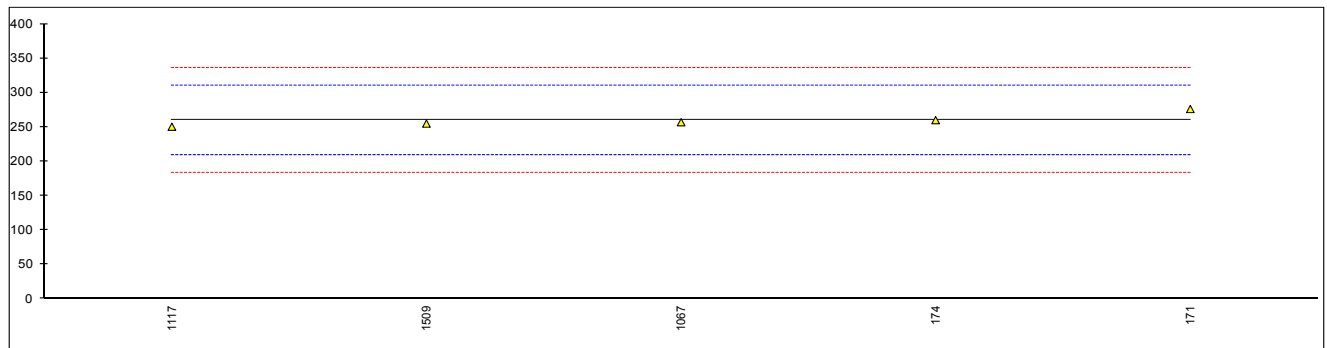


Determination of 1,2-Diethylbenzene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		----		----	
171	D5135	2.3		----	
173		----		----	
174	D5135	3		----	
273		----		----	
311		----		----	
323		----		----	
333		----		----	
343		----		----	
347		----		----	
357		----		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860		----		----	
862		----		----	
863		----		----	
867		----		----	
868		----		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	<10		----	
1107		----		----	
1117	D5135	<5		----	
1201		----		----	
1252		----		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 270
1509	in house	<5		----	
1515		----		----	
1823		----		----	
1862		----		----	
1866		----		----	
1880		----		----	
7014		----		----	
9008		----		----	
	normality	n.a.			
	n	5			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

Determination of sum of α -Methylstyrene and 1,2-Diethylbenzene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		----		----	
171	D5135	276.2		0.65	
173		----		----	
174	D5135	260		0.01	
273		----		----	
311		----		----	
323		----		----	
333		----		----	
343		----		----	
347		----		----	
357		----		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860		----		----	
862		----		----	
863		----		----	
867		----		----	
868		----		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	257	C	-0.11	first reported: 194
1107		----		----	
1117	D5135	250.5		-0.36	
1201		----		----	
1252		----		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 270
1509	in house	255		-0.19	
1515		----		----	
1823		----		----	
1862		----		----	
1866		----		----	
1880		----		----	
7014		----		----	
9008		----		----	
normality		unknown			
n		5			
outliers		n.a.			
mean (n)		259.74			
st.dev. (n)		9.828			
R(calc.)		27.52			
R(Horwitz)		71.27			



Determination of Phenylacetylene on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	2		----	
171	D5135	0		----	
173	D5135	1		----	
174	D5135	<10		----	
273		----		----	
311	D5135	<10		----	
323	D5135	<10		----	
333		----		----	
343		1		----	
347	D5135	<10		----	
357	D5135	<10		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	<10		----	
858	D5135	<10		----	
860	D5135	<10		----	
862	D5135	<10		----	
863	D5135	<10		----	
867		----		----	
868		----		----	
869	D5135	<10		----	
902		----		----	
913		----		----	
1067	D5135	n.d.		----	
1107	in house	<10		----	
1117	D5135	<5		----	
1201		----		----	
1252	D5135	1.33		----	
1264	D5135	1		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 270
1509	D5135	<5		----	
1515		----		----	
1823		----		----	
1862	D5135	<10		----	
1866		----		----	
1880	D5135	<10		----	
7014	D5135	1.6		----	
9008		----		----	
	normality	n.a.			
	n	25			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

Determination of 3- & 4-Methylstyrenes on sample #15190; results in mg/kg

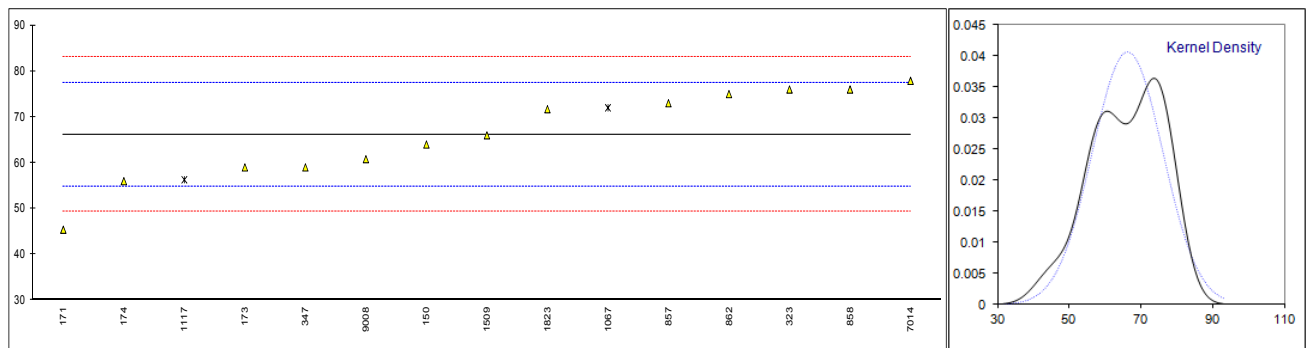
lab	method	value	mark	z(targ)	remarks
150		----		----	
171		----		----	
173		----		----	
174	D5135	<10		----	
273		----		----	
311		----		----	
323		----		----	
333		----		----	
343		----		----	
347		----		----	
357		----		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860		----		----	
862		----		----	
863		----		----	
867		----		----	
868		----		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	<5		----	
1201		----		----	
1252		----		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	in house	<5		----	
1515		----		----	
1823		----		----	
1862		----		----	
1866		----		----	
1880		----		----	
7014		----		----	
9008		----		----	
	normality	n.a.			
	n	4			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

Determination of sum; Phenylacetylene and 3-&4-Methylstyrenes on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		----		----	
171		----		----	
173		----		----	
174	D5135	<10		----	
273		----		----	
311		----		----	
323		----		----	
333		----		----	
343		----		----	
347		----		----	
357		----		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860		----		----	
862		----		----	
863		----		----	
867		----		----	
868		----		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	n.d.		----	
1107		----		----	
1117	D5135	<5		----	
1201		----		----	
1252		----		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509	in house	<5		----	
1515		----		----	
1823		----		----	
1862		----		----	
1866		----		----	
1880		----		----	
7014		----		----	
9008		----		----	
	normality	n.a.			
	n	4			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

Determination of Benzaldehyde on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	64		-0.38	
171	D5135	45.4		-3.68	
173	D5135	59		-1.27	
174	D5135	56		-1.80	
273		----		----	
311		----		----	
323	D5135	76		1.75	
333		----		----	
343		----		----	
347	D5135	59		-1.27	
357		----		----	
446		----		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857	D5135	73		1.22	
858	D5135	76		1.75	
860		----		----	
862	D5135	75		1.57	
863		----		----	
867		----		----	
868		----		----	
869		----		----	
902		----		----	
913		----		----	
1067	D5135	72	ex	1.04	note: higher than total Aldehyde by titration, see §4.1
1107		----		----	
1117	D5135	56.3	ex	-1.75	note: higher than total Aldehyde by titration, see §4.1
1201		----		----	
1252		----		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: 82
1509	D5135	66		-0.02	
1515		----		----	
1823	D5135	71.7		0.99	
1862		----		----	
1866		----		----	
1880		----		----	
7014	D5135	77.9	C	2.09	first reported:113.7
9008	D5135	60.8		-0.95	
normality		OK			
n		13			
outliers		0+2ex			
mean (n)		66.14			
st.dev. (n)		9.820			
R(calc.)		27.50			
R(Horwitz)		15.77			



Determination of Nonaromatics on sample #15190; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D5135	1		----	
171	D5135	5.5	C	----	first reported: 409.8
173	D5135	4		----	
174	D5135	<10		----	
273		----		----	
311		----		----	
323	D5135	15		----	
333		----		----	
343		----		----	
347	D5135	16		----	
357	D5135	<10		----	
446	D5135	<10		----	
551		----		----	
557		----		----	
613		----		----	
663		----		----	
857		----		----	
858		----		----	
860		----		----	
862		----		----	
863		----		----	
867	D5135	<10		----	
868	D5135	<10		----	
869		----		----	
902		----		----	
913	D5135	<10		----	
1067	D5135	n.d.		----	
1107		----		----	
1117		----		----	
1201		----		----	
1252	D5135	<1		----	
1264		----		----	
1429		----	W	----	result withdrawn, see §4.1, reported: <10
1509		----		----	
1515		----		----	
1823	D5135	n.d.		----	
1862		----		----	
1866		----		----	
1880		----		----	
7014		----		----	
9008	D5135	<10		----	
	normality	n.a.			
	n	13			
	outliers	n.a.			
	mean (n)	<10			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(Horwitz)	n.a.			

APPENDIX 2

Number of participants per country

1 lab in AUSTRALIA
2 labs in BELGIUM
2 labs in BRAZIL
1 lab in CANADA
9 labs in CHINA, People's Republic
1 lab in FINLAND
1 lab in FRANCE
1 lab in INDIA
1 lab in IRAN, Islamic Republic of
2 labs in KUWAIT
4 labs in NETHERLANDS
1 lab in RUSSIAN FEDERATION
2 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SOUTH AFRICA
2 labs in SPAIN
1 lab in THAILAND
1 lab in TURKEY
1 lab in UNITED ARAB EMIRATES
2 labs in UNITED KINGDOM
4 labs in UNITED STATES OF AMERICA

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
W	= result withdrawn on request of participant
ex	= excluded from calculations
n.a.	= not applicable
n.d.	= not detected
n.e.	= not evaluated

Literature

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