Results of Proficiency Test
Styrene
October 2021

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1999 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Styrene in accordance with the latest version of ASTM D2827 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of Styrene.

In this interlaboratory study 42 laboratories in 21 different countries registered for participation. See appendix 2 for the number of participants per country. In this report the results of the Styrene proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send one sample Styrene in a 0.5L glass bottle labelled #21180.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for the statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

A batch of approximately 50 liters of Styrene was obtained from a local supplier. This batch was spiked with Trichlorobenzene, Thiophene, Benzene and Toluene. After homogenization 92 amber glass bottles of 0.5L were filled and labelled #21180.
The homogeneity of the subsamples was checked by determination of Density at 20°C in accordance with ASTM D4052 and by determination of Organic Chloride in accordance with ASTM D5808 on 8 stratified randomly selected subsamples.

	Density at 20°C in kg/L	Organic Chloride in mg/kg
sample #21180-1	0.90622	3.3
sample #21180-2	0.90622	3.4
sample #21180-3	0.90622	3.4
sample #21180-4	0.90621	3.2
sample #21180-5	0.90624	3.5
sample #21180-6	0.90622	3.5
sample #21180-7	0.90624	3.4
sample #21180-8	0.90623	3.5

Table 1: homogeneity test results of subsamples #21180

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

	Density at 20°C in kg/L	Organic Chloride in mg/kg
r (observed)	0.00003	0.3
reference test method	ISO12185:96	D5808:20
0.3 x R (reference test method)	0.00015	0.4

Table 2: evaluation of the repeatabilities of subsamples #21180

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

To each of the participating laboratories one sample Styrene labelled #21180 was sent on September 08, 2021. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

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

2.6 ANALYZES

The participants were requested to determine: Aldehydes as Benzaldehyde, Appearance, Organic Chloride, Color Pt/Co, Density at 20°C, Inhibitor as TBC, Peroxides as H_2O_2, Polymer, Total Sulfur, Water, Purity by GC, Benzene, Toluene, Ethylbenzene, sum of m- and p-Xylenes, iso-Propylbenzene (Cumene), o-Xylene, n-Propylbenzene, sum of m- and p-Ethyltoluenes, alpha-Methylstyrene, 1,2-Diethylbenzene, sum of alpha-Methylstyrene and 1,2-Diethylbenzene, Phenylacetylene, 3/4-Methylstyrenes, sum of Phenylacetylene and 3/4-Methylstyrenes, Benzaldehyde and Non-aromatics.
It was also requested to report some analytical details on the determination of Aldehydes as Benzaldehyde.

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

To get comparable test results a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

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

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

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

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

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

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

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

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

3.2 GRAPHICS

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

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms.

Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements (derived from e.g. ISO or ASTM test methods), the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

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

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

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

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

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

4 EVALUATION

Some problems were encountered with the dispatch of the samples due to COVID-19 pandemic. Therefore, the reporting time on the data entry portal was extended with another two weeks. One participant reported test results after the extended reporting date and fourteen other participants did not report any test results. Not all laboratories were able to report all tests requested.
In total 28 participants reported 345 numerical test results. Observed were 16 outlying test results, which is 4.6%. In proficiency studies outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER TEST

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

Unfortunately, a suitable reference test method, providing the precision data, is not available for all determinations. For these tests the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D2121) and if appropriate an indication of sub test method (e.g. D2121-A) and an added designation for the year that the test method was adopted or revised (e.g. D2121-A:16).

Aldehydes as Benzaldehyde: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D7704:16. Only two laboratories reported to have used ASTM D7704 as test method. Most other participants reported the use of ASTM D2119 which was withdrawn in 2018.

Appearance: This determination was not problematic. All reporting participants agreed about the appearance of the sample as Pass (bright, clear and free from suspended matter).

Organic Chloride: 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 D5808:20.

Color Pt/Co: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D5386:16.

Density at 20°C: 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 ISO12185:96.

Inhibitor as TBC: This determination was not problematic. No statisticals outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4590:18.

Peroxides as H_2O_2: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D2340:18.

Polymer: This determination was not problematic. No statisticals outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D2121-A:16.

Total Sulfur: This determination was not problematic. No statisticals outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D5453:19a.

Water: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM E1064:16.

Purity by GC: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5135:21.

Benzene: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5135:21.

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

Ethylbenzene: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5135:21.

sum of m- and p-Xylenes: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

iso-Propylbenzene: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

o-Xylene: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

n-Propylbenzene: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

sum of m- and p-Ethyltoluenes: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

alpha-Methylstyrene: 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 D5135:21.

1,2-Diethylbenzene: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

sum of alpha-Methylstyrene and 1,2-Diethylbenzene: Only three participants reported a test result. No conclusions could be drawn from this and no z-scores were calculated.

Phenylacetylene: This determination was not problematic. The reporting participants agreed on a value near or below the application range. Therefore, no z-scores are calculated.

3/4-Methylstyrenes: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the estimated reproducibility calculated with the Horwitz equation.

sum of Phenylacetylene and 3/4-Methylstyrenes: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the estimated reproducibility calculated with the Horwitz equation.

Benzaldehyde: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5135:21.

Non-aromatics: 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 D5135:21.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the reference test method and the reproducibility as found for the group of participating laboratories. The number of significant test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from literature reference test methods (in casu ASTM test methods) or estimated using the Horwitz equation are presented in the next table.

Parameter	unit	n	average	2.8 * sd	R(lit)
Aldehydes as Benzaldehyde	mg/kg	16	85.9	48.9	106
Appearance		23	Pass	n.a.	n.a.
Organic Chloride	mg/kg	9	3.1	0.6	1.3
Color Pt/Co		25	8.9	5.7	6.0
Density at 20°C	kg/L	23	0.9063	0.0001	0.0005
Inhibitor as TBC	mg/kg	25	6.4	2.5	2.8

Parameter	unit	n	average	2.8 * sd	R(lit)
Peroxides as H_2O_2	mg/kg	18	21.1	17.7	13
Polymer	mg/kg	13	0.83	1.02	3.06
Total Sulfur	mg/kg	19	2.3	1.0	1.1
Water	mg/kg	26	152	51	44
Purity by GC	%M/M	21	99.949	0.026	0.031
Benzene	mg/kg	19	10.3	3.5	4.4
Toluene	mg/kg	13	21.5	4.9	6.1
Ethylbenzene	mg/kg	22	118.8	24.9	26.4
sum of m- and p-Xylenes	mg/kg	14	<10	n.e.	n.e.
iso-Propylbenzene (Cumene)	mg/kg	14	<10	n.e.	n.e.
o-Xylene	mg/kg	15	<10	n.e.	n.e.
n-Propylbenzene	mg/kg	12	<10	n.e.	n.e.
sum of m- and p-Ethyltoluenes	mg/kg	10	<10	n.e.	n.e.
alpha-Methylstyrene	mg/kg	19	245.4	60.2	39.5
1,2-Diethylbenzene	mg/kg	4	<10	n.e.	n.e.
Phenylacetylene	mg/kg	12	<10	n.e.	n.e.
3/4-Methylstyrenes	mg/kg	6	7.8	8.9	3.6
sum of Phenylacetylene and 3/4-Methylstyrenes	mg/kg	5	13.2	6.2	7.0
Benzaldehyde	mg/kg	8	51.2	16.0	19.2
Non-aromatics	mg/kg	8	57.7	98.4	67.4

Table 3: reproducibilities of tests on sample #21180

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF OCTOBER 2021 WITH PREVIOUS PTS

	October 2021	October 2020	October 2019	October 2018	October 2017
Number of reporting laboratories	28	37	29	39	38
Number of test results	345	498	468	649	524
Number of statistical outliers	16	9	10	25	24
Percentage of statistical outliers	4.6%	1.8%	2.1%	3.9%	4.6%

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 to the requirements of the reference test methods. The conclusions are given in the following table.

Parameter	October 2021	October 2020	October 2019	October 2018	October 2017
Aldehydes as Benzaldehyde	++	++	++	--	-
Organic Chloride	++	+	+/-	+	+
Color Pt/Co	+/-	+	+	+	++
Density at 20°C	++	++	++	++	++
Inhibitor as TBC	+	+	+	+/-	+
Peroxides as H_2O_2	-	-	-	-	-
Polymer	++	+	++	++	+
Total Sulfur	+/-	n.e.	-	+/-	+/-
Water	-	+	-	+	++
Purity by GC	+	+	-	--	+
Benzene	+	n.e.	+	+	++
Toluene	+	n.e.	+	+/-	n.e.
Ethylbenzene	+/-	+/-	+	+	++
sum of m- and p-Xylenes	n.e.	+	+/-	+	n.e.
iso-Propylbenzene (Cumene)	n.e.	n.e.	--	-	n.e.
o-Xylene	n.e.	n.e.	+	+	+
n-Propylbenzene	n.e.	n.e.	--	-	n.e.
sum of m- and p-Ethyltoluenes	n.e.	n.e.	-	+	n.e.
alpha-Methylstyrene	-	+/-	+	-	+
1,2-Diethylbenzene	n.e.	n.e.	n.e.	n.e.	n.e.
sum of alpha-Methylstyrene and 1,2-Diethylbenzene	n.e.	-	n.e.	(--)	+/-
Phenylacetylene	n.e.	n.e.	-	+/-	n.e.
3/4-Methylstyrenes	--	n.e.	n.e.	+/-	n.e.
sum of Phenylacetylene and 3/4-Methylstyrenes	+	n.e.	n.e.	(--)	n.e.
Benzaldehyde	+	-	-	--	+
Non-aromatics	-	-	-	+/-	+

Table 5: comparison determinations against the reference test methods

Results between brackets should be used with due care

The following performance categories were used:

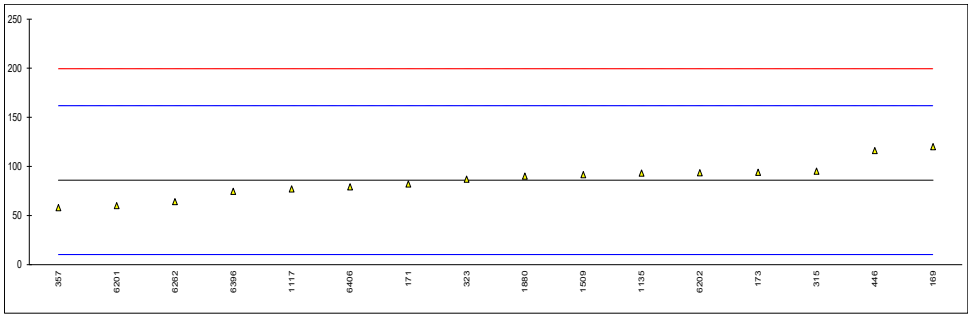
- ++ : group performed much better than the reference test method
- + : group performed better than the reference test method
- +/- : group performance equals the reference test method
- - : group performed worse than the reference test method
- -- : group performed much worse than the reference test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

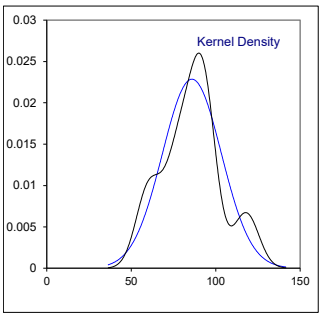
APPENDIX 1

Determination of Aldehydes as Benzaldehyde on sample #21180; results in mg/kg

lab	method	molarity NaOH	value	mark	z(targ)	remarks
150		---	-----		-----	
169	D2119	0.02 N NaOH	120		0.90	
171	D2119	0.05 N NaOH	82.1		-0.10	
173	D2119	0.05 N NaOH	94		0.21	
273		---	-----		-----	
315	D2119	0.05 N NaOH	95	C	0.24	first reported 0.010 mg/kg
317		---	-----		-----	
323	D4423	---	87		0.03	
333		---	-----		-----	
347		---	-----		-----	
357	D2119	0.05 N NaOH	58		-0.74	
395		---	-----		-----	
446	D2119	---	116		0.79	
551		---	-----		-----	
557		---	-----		-----	
857		---	-----		-----	
858		---	-----		-----	
860		---	-----		-----	
863		---	-----		-----	
868		---	-----		-----	
869		---	-----		-----	
902		---	-----		-----	
913		---	-----		-----	
1117	D7704	0.02 N NaOH	77		-0.24	
1135	D2119	---	93		0.19	
1169		---	-----		-----	
1189		0.05 N NaOH	-----		-----	
1264		---	-----		-----	
1509	D2119	0.05 N NaOH	91.61		0.15	
1515		---	-----		-----	
1823		---	-----		-----	
1880	D7704	0.02 N KOH in Methanol	90.0		0.11	
2320		---	-----		-----	
6198		---	-----		-----	
6201	D2119	---	60	C	-0.69	first reported 0.006 mg/kg
6202	D2119	0.05 N NaOH	93.495		0.20	
6262	D2119	0.05N KOH	64		-0.58	
6389		---	-----		-----	
6396	D2119	0.02 N NaOH	74.6	C	-0.30	first reported 0.00746 mg/kg
6406	D2119	0.05 N NaOH	79.19		-0.18	
7014		---	-----		-----	
9008		---	-----		-----	

normality	OK
n	16
outliers	0
mean (n)	85.937
st.dev. (n)	17.4569
R(calc.)	48.879
st.dev.(D7704:16)	37.8571
R(D7704:16)	106





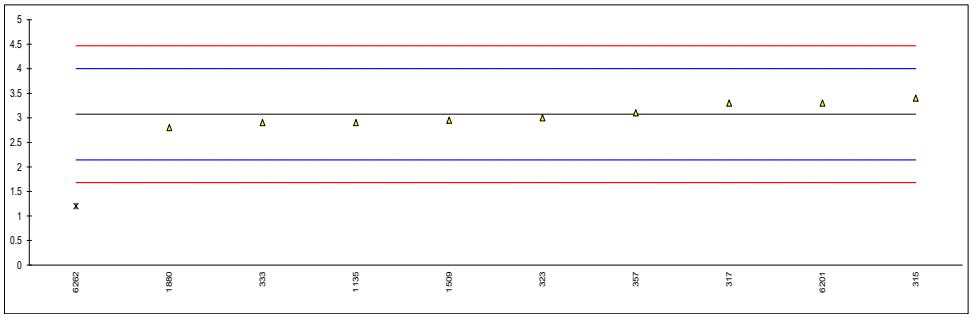
Determination of Appearance on sample #21180;

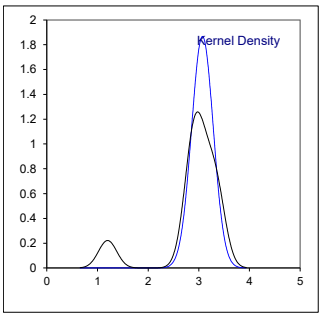
lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	E2680	Pass		-----	
171	E2680	CFSM		-----	
173	D4176	Pass		-----	
273	Visual	Bright & Clear		-----	
315	E2680	pass		-----	
317	D4176	PASS		-----	
323	Visual	clear & bright liquid		-----	
333		-----		-----	
347	E2680	Pass		-----	
357	E2680	Pass		-----	
395	E2680	PASS		-----	
446	D4176	Pass		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		PASS		-----	
913		-----		-----	
1117	D4176	pass		-----	
1135	Visual	CFSM		-----	
1169	D4176	Pass		-----	
1189	Visual	C/B		-----	
1264		-----		-----	
1509	E2680	Clear & FFSM		-----	
1515	E2680	Pass		-----	
1823		-----		-----	
1880	Visual	Pass		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	Visual	Clear		-----	
6262	Visual	Cl. & Br.		-----	
6389		-----		-----	
6396		-----		-----	
6406	Visual	Clear and Bright		-----	
7014	Visual	Clear		-----	
9008		-----		-----	
	n	23			
	mean (n)	Pass			

Determination of Organic Chloride on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171		-----		-----	
173		-----		-----	
273		-----		-----	
315	D5808	3.4		0.71	
317	UOP779	3.3		0.49	
323	D5808	3		-0.16	
333	D5808	2.9		-0.37	
347		-----		-----	
357	D5808	3.1		0.06	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117		-----		-----	
1135	UOP779	2.9		-0.37	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5808	2.95		-0.26	
1515		-----		-----	
1823		-----		-----	
1880	D7359	2.8		-0.59	
2320		-----		-----	
6198		-----		-----	
6201	D5808	3.3		0.49	
6202		-----		-----	
6262	UOP779	1.2	C,G(0.01)	-4.03	first reported 1.5
6389		-----		-----	
6396		-----		-----	
6406		-----		-----	
7014		-----		-----	
9008		-----		-----	

normality	OK
n	9
outliers	1
mean (n)	3.072
st.dev. (n)	0.2138
R(calc.)	0.599
st.dev.(D5808:20)	0.4643
R(D5808:20)	1.3

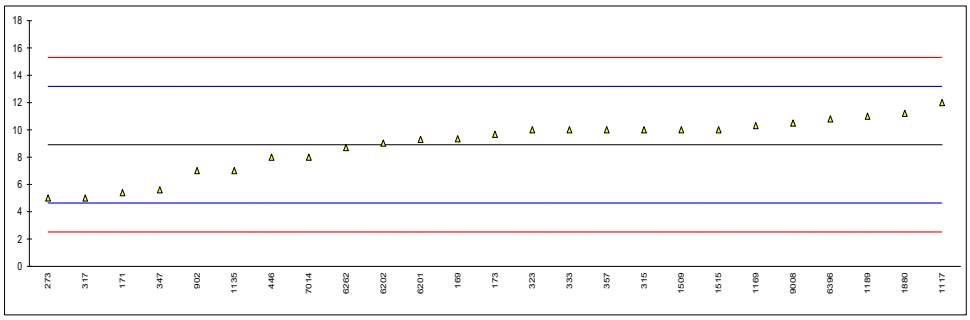


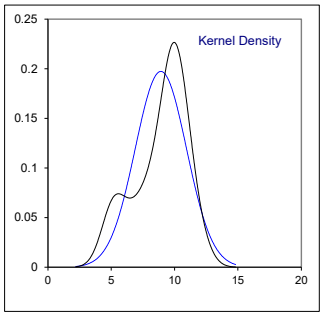


Determination of Color Pt/Co on sample #21180;

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D5386	9.35		0.20	
171	D5386	5.4		-1.65	
173	D5386	9.67		0.35	
273	D1209	5		-1.83	
315	D5386	10		0.51	
317	D1209	5		-1.83	
323	D5386	10		0.51	
333	D1209	10		0.51	
347	D5386	5.6		-1.55	
357	D5386	10		0.51	
395	D1209	<10		-----	
446	D5386	8		-0.43	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	D5386	7		-0.90	
913		-----		-----	
1117	D1209	12		1.45	
1135	D5386	7		-0.90	
1169	D5386	10.3		0.65	
1189	D5386	11		0.98	
1264		-----		-----	
1509	D1209	10		0.51	
1515	D1209	10		0.51	
1823		-----		-----	
1880	D5386	11.2		1.07	
2320		-----		-----	
6198		-----		-----	
6201	D1209	9.3		0.18	
6202	D1209	9.025		0.05	
6262	D5386	8.7		-0.10	
6389		-----		-----	
6396	D5386	10.8		0.88	
6406	D1209	<5	C	-----	first reported 2
7014	D1209	8		-0.43	
9008	D5386	10.5		0.74	

	normality	OK
	n	25
	outliers	0
	mean (n)	8.91
	st.dev. (n)	2.022
	R(calc.)	5.66
	st.dev.(D5386:16)	2.135
	R(D5386:16)	5.98
Compare		
	R(D1209:05)	7

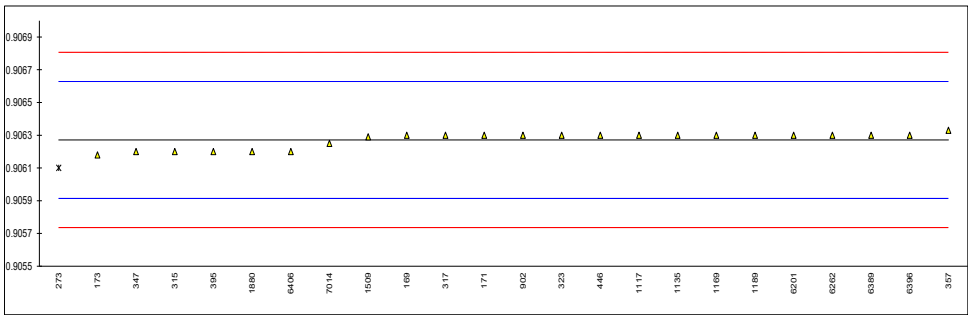


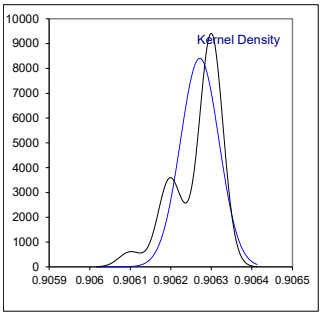


Determination of Density at 20°C on sample #21180; results in kg/L

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D4052	0.9063		0.16	
171	D4052	0.9063		0.16	
173	D4052	0.90618		-0.51	
273	D4052	0.9061	R(0.05)	-0.96	
315	D4052	0.9062		-0.40	
317	ISO12185	0.9063		0.16	
323	D4052	0.9063		0.16	
333		-----		-----	
347	D4052	0.9062		-0.40	
357	D4052	0.90633		0.33	
395	D4052	0.9062		-0.40	
446	D4052	0.9063		0.16	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	ISO12185	0.9063		0.16	
913		-----		-----	
1117	D4052	0.9063	C	0.16	first reported 906.3 kg/L
1135	ISO12185	0.9063		0.16	
1169	D4052	0.90630		0.16	
1189	D4052	0.9063	C	0.16	first reported 0.9067
1264		-----		-----	
1509	D4052	0.90629		0.10	
1515		-----		-----	
1823		-----		-----	
1880	D4052	0.9062		-0.40	
2320		-----		-----	
6198		-----		-----	
6201	ISO12185	0.9063		0.16	
6202		-----		-----	
6262	D4052	0.9063		0.16	
6389	ISO2811-1	0.9063		0.16	
6396	D4052	0.9063		0.16	
6406	ISO12185	0.9062		-0.40	
7014	D4052	0.90625		-0.12	
9008		-----		-----	

	normality	OK
	n	23
	outliers	1
	mean (n)	0.90627
	st.dev. (n)	0.000047
	R(calc.)	0.00013
	st.dev.(ISO12185:96)	0.000179
	R(ISO12185:96)	0.0005
Compare		
	R(D4052:18a)	0.0005

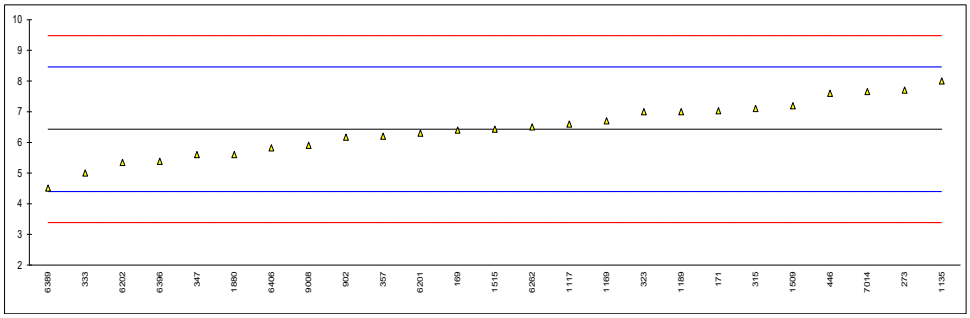


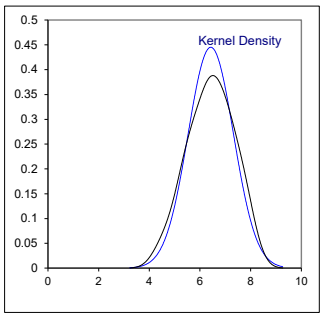


Determination of Inhibitor as TBC on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D4590	6.4	C	-0.03	first reported 11.5
171	D4590	7.03		0.59	
173		-----		-----	
273	D4590	7.7		1.25	
315	D4590	7.1		0.66	
317		-----		-----	
323	D4590	7		0.56	
333	D4590	5.0		-1.41	
347	D4590	5.6		-0.82	
357	D4590	6.2		-0.23	
395		-----		-----	
446	D4590	7.6		1.15	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	D4590	6.17		-0.26	
913		-----		-----	
1117	D4590	6.6		0.17	
1135	D4590	8		1.55	
1169	D4590	6.7		0.27	
1189	D4590	7.0		0.56	
1264		-----		-----	
1509	D4590	7.194		0.75	
1515	D4590	6.4285		0.00	
1823		-----		-----	
1880	D4590	5.6		-0.82	
2320		-----		-----	
6198		-----		-----	
6201	D4590	6.3		-0.13	
6202	D4590	5.345		-1.07	
6262	D4590	6.5		0.07	
6389	D4590	4.507		-1.89	
6396	D4590	5.379746833		-1.03	
6406	D4590	5.82		-0.60	
7014	D4590	7.65		1.20	
9008	D4590	5.9		-0.52	

normality	OK
n	25
outliers	0
mean (n)	6.429
st.dev. (n)	0.8962
R(calc.)	2.509
st.dev.(D4590:18)	1.0152
R(D4590:18)	2.842

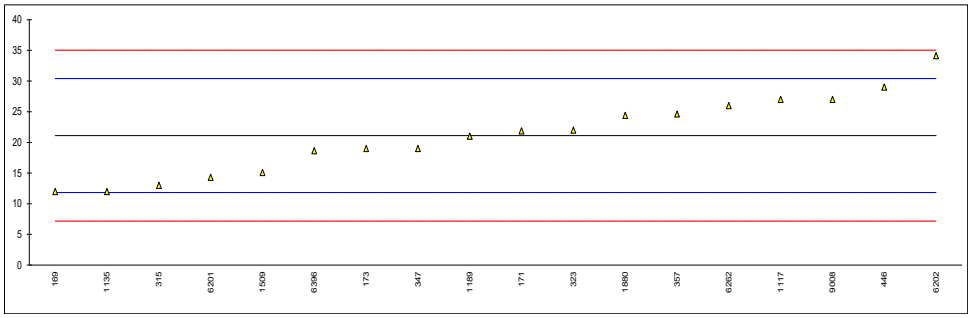


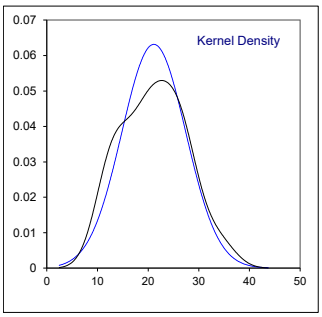


Determination of Peroxides as H_2O_2 on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D2340	12		-1.96	
171	D2340	21.86		0.16	
173	D2340	19		-0.45	
273		-----		-----	
315	D2340	13		-1.75	
317		-----		-----	
323	D2340	22		0.19	
333		-----		-----	
347	D2340	19		-0.45	
357	D2340	24.6		0.75	
395		-----		-----	
446	D2340	29		1.70	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D2340	27		1.27	
1135	D2340	12		-1.96	
1169		-----		-----	
1189	D2340	21		-0.02	
1264		-----		-----	
1509	D2340	15.08		-1.30	
1515		-----		-----	
1823		-----		-----	
1880	D2340	24.4		0.71	
2320		-----		-----	
6198		-----		-----	
6201	D2340	14.3		-1.47	
6202	D2340	34.11		2.80	
6262	D2340	26		1.05	
6389		-----		-----	
6396	D2340	18.63		-0.53	
6406		-----		-----	
7014		-----		-----	
9008	D2340	27		1.27	

normality	OK
n	18
outliers	0
mean (n)	21.110
st.dev. (n)	6.3174
R(calc.)	17.689
st.dev.(D2340:18)	4.6429
R(D2340:18)	13

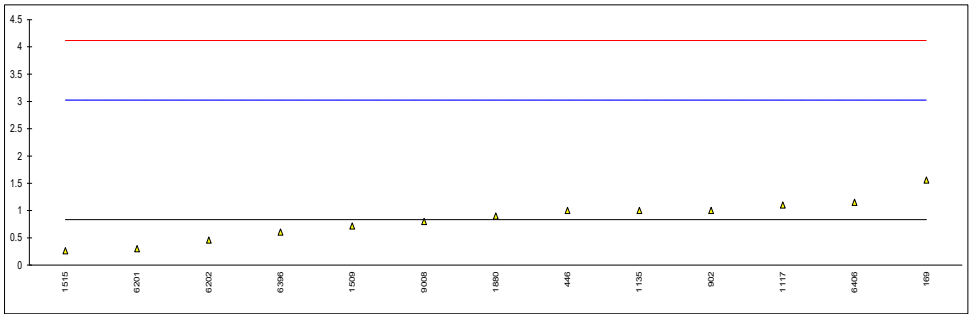


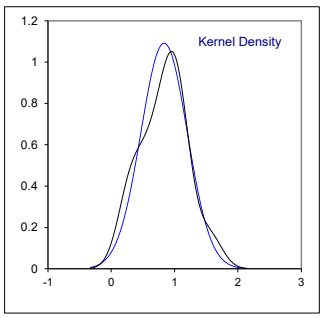


Determination of Polymer on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D2121-A	1.557	C	0.66	first reported 1.826
171	D2121-A	<1		-----	
173		-----		-----	
273	D2121-A	<1		-----	
315	D2121-A	<1		-----	
317		-----		-----	
323	D2121-A	<1		-----	
333	D2121-A	<1		-----	
347	D2121-A	<1		-----	
357	D2121-A	< 1		-----	
395		-----		-----	
446	D2121-A	1		0.15	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	D2121-A	1		0.15	
913		-----		-----	
1117	D2121-A	1.1		0.24	
1135	D2121-A	1		0.15	
1169	D2121-A	<1		-----	
1189		-----		-----	
1264		-----		-----	
1509	D2121-A	0.718		-0.11	
1515	D2121-A	0.25978		-0.53	
1823		-----		-----	
1880	D2121-A	0.9		0.06	
2320		-----		-----	
6198		-----		-----	
6201	D2121-A	0.3		-0.49	
6202	D2121-A	0.459		-0.34	
6262	D2121-A	<1		-----	
6389		-----		-----	
6396	D2121-A	0.607449857		-0.21	
6406	D2121-A	1.15		0.29	
7014	D2121-A	<1		-----	
9008	D2121-A	0.8		-0.03	

normality	OK
n	13
outliers	0
mean (n)	0.835
st.dev. (n)	0.3654
R(calc.)	1.023
st.dev.(D2121-A:16)	1.0946
R(D2121-A:16)	3.065

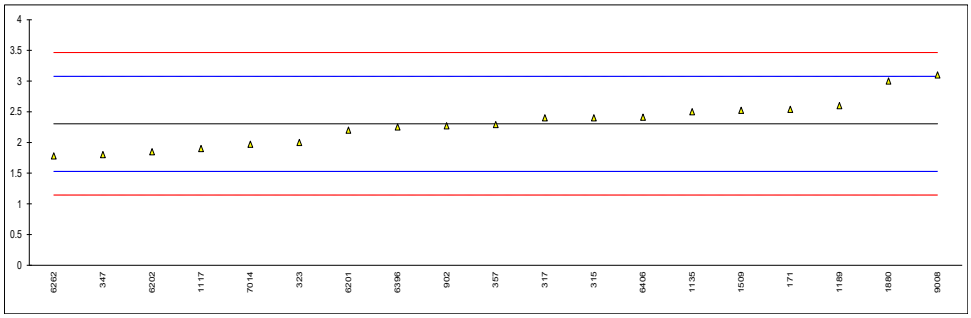


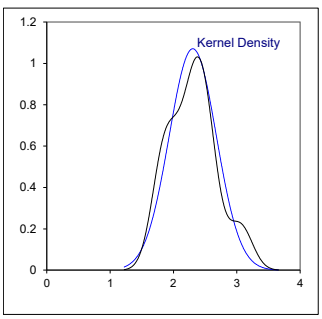


Determination of Total Sulfur on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5453	2.539		0.61	
173		-----		-----	
273		-----		-----	
315	D5453	2.4		0.25	
317	D5453	2.4		0.25	
323	D5453	2		-0.79	
333		-----		-----	
347	D5453	1.8		-1.30	
357	D5453	2.29		-0.04	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	D5453	2.27		-0.09	
913		-----		-----	
1117	D5453	1.9		-1.04	
1135	D5453	2.5		0.51	
1169		-----		-----	
1189	D5453	2.6		0.76	
1264		-----		-----	
1509	D5453	2.523		0.57	
1515		-----		-----	
1823		-----		-----	
1880	D5453	3.0		1.80	
2320		-----		-----	
6198		-----		-----	
6201	D5453	2.2		-0.27	
6202	D5453	1.8475		-1.18	
6262	D5453	1.778		-1.36	
6389		-----		-----	
6396	D5453	2.25		-0.14	
6406	ISO20846	2.41		0.27	
7014	D5453	1.97		-0.86	
9008	D5453	3.1		2.06	

normality	OK
n	19
outliers	0
mean (n)	2.304
st.dev. (n)	0.3725
R(calc.)	1.043
st.dev.(D5453:19a)	0.3872
R(D5453:19a)	1.084

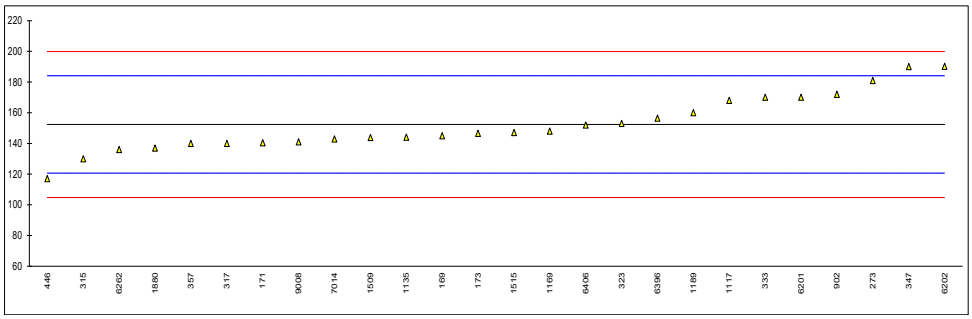


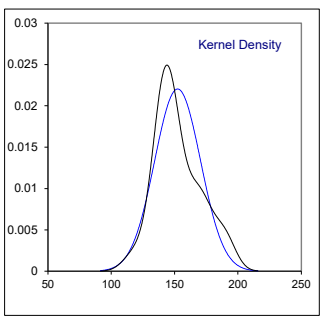


Determination of Water on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	E1064	145.01		-0.46	
171	E1064	140.36		-0.76	
173	E1064	146.5071		-0.37	
273	E203	181		1.81	
315	E1064	130		-1.41	
317	E1064	140		-0.78	
323	E1064	153		0.04	
333	D1364	170		1.11	
347	E1064	190		2.37	
357	E1064	140		-0.78	
395		-----		-----	
446	D1364	117		-2.23	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	E1064	172		1.24	
913		-----		-----	
1117	D4672	168		0.99	
1135	E1064	144		-0.53	
1169	E1064	148		-0.27	
1189	E1064	160		0.48	
1264		-----		-----	
1509	E1064	143.8		-0.54	
1515	E1064	147		-0.34	
1823		-----		-----	
1880	E1064	137		-0.97	
2320		-----		-----	
6198		-----		-----	
6201	E1064	170		1.11	
6202	D6304	190.225		2.39	
6262	D1364	136		-1.03	
6389		-----		-----	
6396	D6304	156.4		0.26	
6406	E1064	152	C	-0.02	first reported 252
7014	E1064	142.86		-0.60	
9008	E1064	141		-0.72	

normality	OK
n	26
outliers	0
mean (n)	152.35
st.dev. (n)	18.111
R(calc.)	50.71
st.dev.(E1064:16)	15.862
R(E1064:16)	44.41

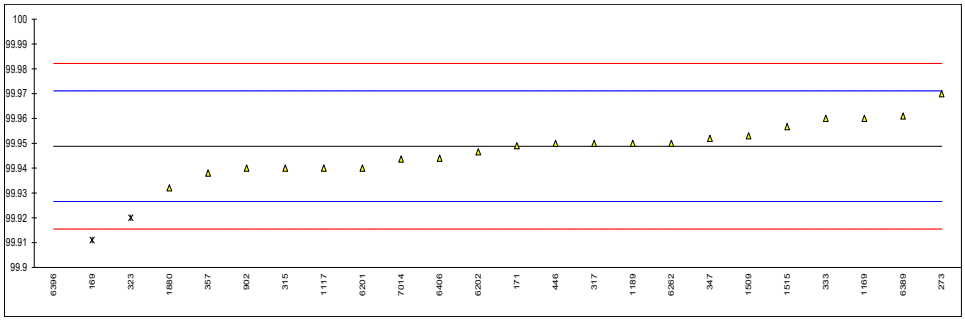


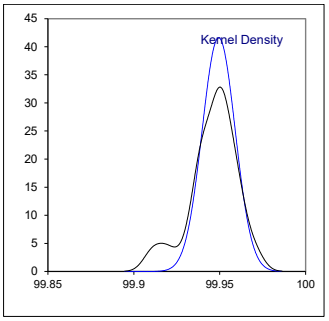


Determination of Purity by GC on sample #21180; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D5135	99.911	DG(0.05)	-3.40	
171	D5135	99.949		0.01	
173		-----		-----	
273	D5135	99.97		1.90	
315	D5135	99.94		-0.79	
317	D7504	99.95		0.10	
323	D5135	99.92	DG(0.05)	-2.59	
333	D5135	99.96		1.00	
347	D5135	99.952		0.28	
357	D5135	99.938		-0.97	
395		-----		-----	
446	D5135	99.95		0.10	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902	D5135	99.94		-0.79	
913		-----		-----	
1117	D5135	99.94		-0.79	
1135		-----		-----	
1169	D5135	99.96		1.00	
1189	D5135	99.95		0.10	
1264		-----		-----	
1509	D5135	99.953		0.37	
1515	D5135	99.9567		0.71	
1823		-----		-----	
1880	D7504	99.932		-1.51	
2320		-----		-----	
6198		-----		-----	
6201	D5135	99.94		-0.79	
6202	D5135	99.94653		-0.21	
6262	D5135	99.95	C	0.10	first reported 99.87
6389	In house	99.961		1.09	
6396	D5135	84.744	G(0.01)	-1367.19	
6406	D5135	99.944		-0.43	
7014	D5135	99.9436		-0.47	
9008		-----		-----	

normality	OK
n	21
outliers	3
mean (n)	99.9488
st.dev. (n)	0.00924
R(calc.)	0.0259
st.dev.(D5135:21)	0.01112
R(D5135:21)	0.0311

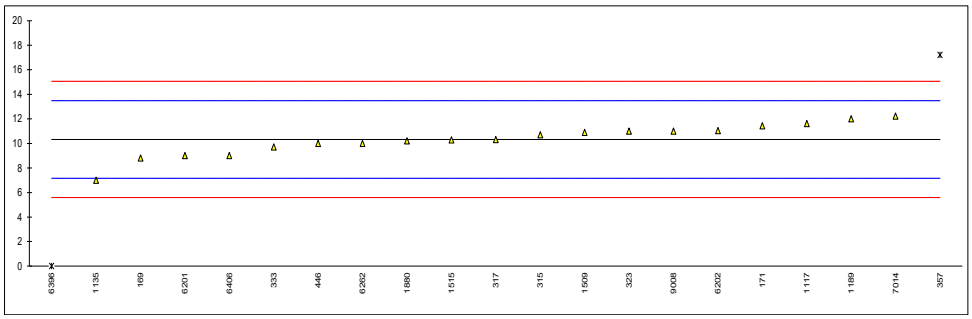


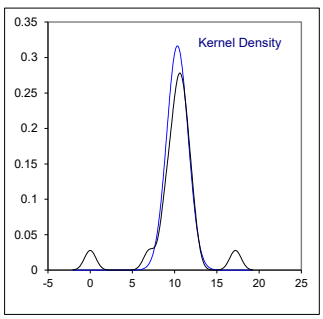


Determination of Benzene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D5135	8.8		-0.96	
171	D6229	11.418		0.69	
173		-----		-----	
273		-----		-----	
315	D6229	10.7		0.24	
317	D6229	10.3		-0.01	
323	D5135	11		0.43	
333	D5135	9.7		-0.39	
347		-----		-----	
357	D5135	17.2	R(0.01)	4.35	
395		-----		-----	
446	D5135	10		-0.20	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	In house	11.6		0.81	
1135	D5135	7		-2.10	
1169		-----		-----	
1189	D5135	12		1.06	
1264		-----		-----	
1509	In house	10.89		0.36	
1515	In house	10.28		-0.03	
1823		-----		-----	
1880	D4534	10.2		-0.08	
2320		-----		-----	
6198		-----		-----	
6201	D5135	9		-0.84	
6202	D5135	11.03		0.45	
6262	D6229	10		-0.20	
6389		-----		-----	
6396	D5135	0	R(0.01)	-6.53	
6406	D6229	9		-0.84	
7014	D5135	12.22		1.20	
9008	D6229	11		0.43	

normality	suspect
n	19
outliers	2
mean (n)	10.323
st.dev. (n)	1.2605
R(calc.)	3.529
st.dev.(D5135:21)	1.5801
R(D5135:21)	4.424

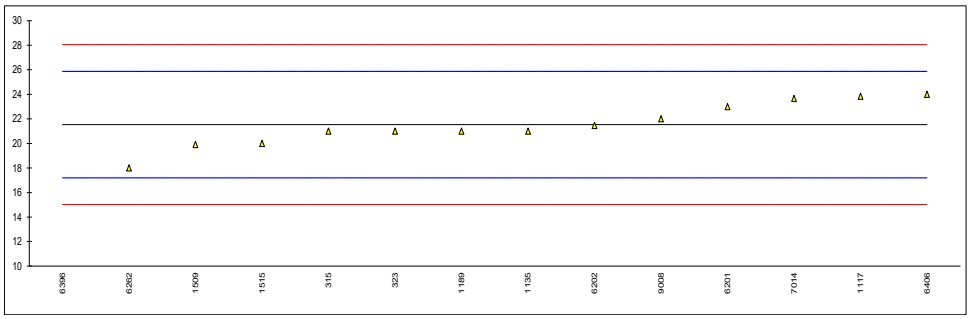


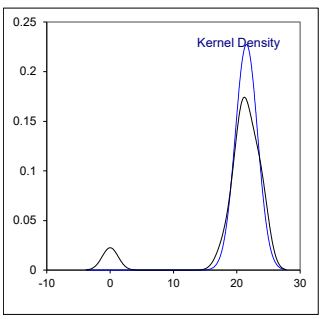


Determination of Toluene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		<-5.31	possibly a false negative test result?
173		-----		-----	
273		-----		-----	
315	D5135	21		-0.24	
317		-----		-----	
323	D7504	21		-0.24	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		<-5.31	possibly a false negative test result?
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	23.84		1.07	
1135	D5135	21		-0.24	
1169		-----		-----	
1189	D5135	21		-0.24	
1264		-----		-----	
1509	D5135	19.9		-0.75	
1515	D5135	20		-0.70	
1823		-----		-----	
1880		-----		-----	
2320		-----		-----	
6198		-----		-----	
6201	D5135	23		0.68	
6202	D5135	21.45		-0.04	
6262	D5135	18		-1.63	
6389		-----		-----	
6396	D5135	0	G(0.01)	-9.92	
6406	D5135	24	C	1.14	first reported 14
7014	D5135	23.66		0.98	
9008	D6229	22		0.22	

normality	OK
n	13
outliers	1
mean (n)	21.527
st.dev. (n)	1.7546
R(calc.)	4.913
st.dev.(Horwitz)	2.1700
R(Horwitz)	6.076

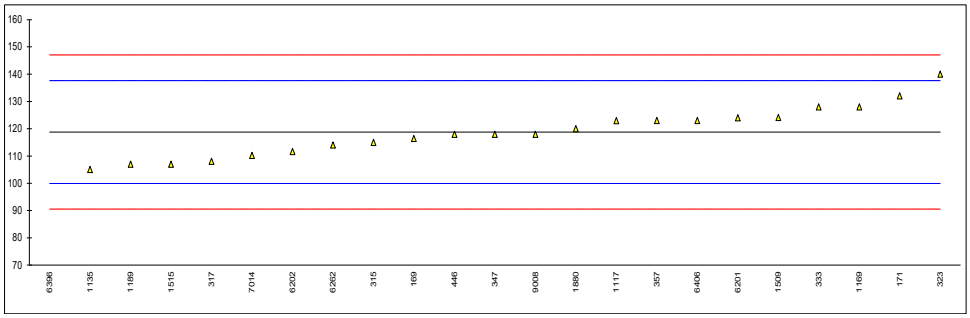


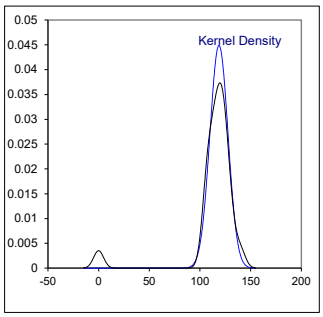


Determination of Ethylbenzene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D5135	116.4		-0.25	
171	D5135	132		1.40	
173		-----		-----	
273		-----		-----	
315	D5135	115		-0.40	
317	D7504	108		-1.15	
323	D5135	140		2.25	
333	D5135	128		0.98	
347	D5135	118		-0.08	
357	D5135	123		0.45	
395		-----		-----	
446	D5135	118		-0.08	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	122.93		0.44	
1135	D5135	105		-1.46	
1169	D5135	128		0.98	
1189	D5135	107		-1.25	
1264		-----		-----	
1509	D5135	124.14		0.57	
1515	D5135	107		-1.25	
1823		-----		-----	
1880	D7504	120		0.13	
2320		-----		-----	
6198		-----		-----	
6201	D5135	124		0.55	
6202	D5135	111.6		-0.76	
6262	D5135	114		-0.51	
6389		-----		-----	
6396	D5135	0	R(0.01)	-12.62	
6406	D5135	123		0.45	
7014	D5135	110.22		-0.91	
9008	D7504	118		-0.08	

normality	OK
n	22
outliers	1
mean (n)	118.786
st.dev. (n)	8.8868
R(calc.)	24.883
st.dev.(D5135:21)	9.4154
R(D5135:21)	26.363





Determination of sum of m- and p-Xylenes on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<30		-----	
317		-----		-----	
323	D5135	<10		-----	
333	D5135	<10	C	-----	first reported 41
347		-----		-----	
357	D7504	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	< 5		-----	
1135	D5135	<10		-----	
1169	D5135	<1		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	0.53		-----	
1515	D5135	2		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	24.40		-----	possibly a false positive test result?
6262	D5135	9		-----	
6389		-----		-----	
6396	D5135	0		-----	
6406		-----		-----	
7014	D5135	<1		-----	
9008	D7504	<10		-----	
	n	14			
	mean (n)	<10			

Determination of iso-Propylbenzene (Cumene) on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<10		-----	
317		-----		-----	
323	D5135	<10		-----	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	< 5		-----	
1135	D5135	<10		-----	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	0		-----	
1515	D5135	0		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201	D5135	<10		-----	
6202	D5135	<3		-----	
6262	D5135	<10		-----	
6389		-----		-----	
6396	D5135	0		-----	
6406		-----		-----	
7014		<1		-----	
9008		-----		-----	
	n	14			
	mean (n)	<10			

Determination of o-Xylene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<10		-----	
317		-----		-----	
323	D5135	<10		-----	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	1.55		-----	
1135	D5135	<10		-----	
1169	D5135	<1		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	1.85		-----	
1515	D5135	0		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201	D5135	<10		-----	
6202	D5135	4.8		-----	
6262	D5135	<10		-----	
6389		-----		-----	
6396	D5135	0		-----	
6406		-----		-----	
7014	D5135	<1		-----	
9008		-----		-----	
	n	15			
	mean (n)	<10			

Determination of n-Propylbenzene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<10		-----	
317		-----		-----	
323	D5135	<10		-----	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	0		-----	
1135	D5135	<10		-----	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	0.79		-----	
1515	D5135	0		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	<3		-----	
6262		-----		-----	
6389		-----		-----	
6396	D5135	0		-----	
6406		-----		-----	
7014	D5135	<1		-----	
9008		-----		-----	
	n	12			
	mean (n)	<10			

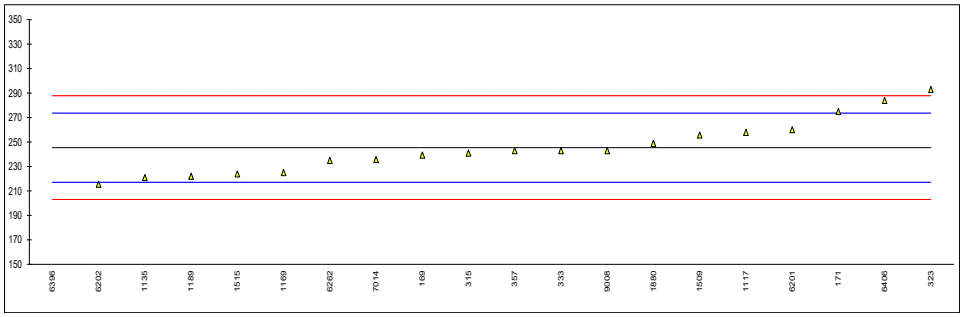
Determination of sum of m- and p-Ethyltoluenes on sample #21180; results in mg/kg

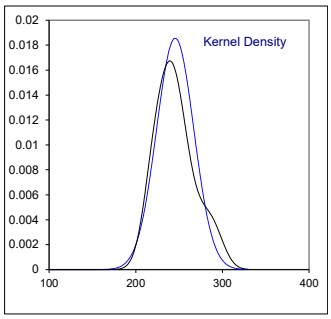
lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	<10		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<20		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	0		-----	
1135	D5135	<10		-----	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	0.83		-----	Only p-Ethyl Toluene reported
1515	D5135	0		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	<3		-----	
6262		-----		-----	
6389		-----		-----	
6396	D5135	0.001759		-----	
6406		-----		-----	
7014	D5135	<1		-----	
9008		-----		-----	
	n	10			
	mean (n)	<10			

Determination of alpha-Methylstyrene on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169	D5135	239.3		-0.43	
171	D5135	275		2.10	
173		-----		-----	
273		-----		-----	
315	D5135	241		-0.31	
317		-----		-----	
323	D5135	293		3.38	
333	D5135	243		-0.17	
347		-----		-----	
357	D5135	243		-0.17	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	257.9		0.89	
1135	D5135	221		-1.73	
1169	D5135	225		-1.44	
1189	D5135	222		-1.66	
1264		-----		-----	
1509	D5135	255.78		0.74	
1515	D5135	224		-1.51	
1823		-----		-----	
1880	D7504	249		0.26	
2320		-----		-----	
6198		-----		-----	
6201	D5135	260		1.04	
6202	D5135	215.4		-2.12	
6262	D5135	235		-0.73	
6389		-----		-----	
6396	D5135	0	R(0.01)	-17.39	
6406	D5135	284		2.74	
7014	D5135	235.66		-0.69	
9008	D7504	243		-0.17	

normality	OK
n	19
outliers	1
mean (n)	245.371
st.dev. (n)	21.4941
R(calc.)	60.183
st.dev.(D5135:21)	14.1109
R(D5135:21)	39.511





Determination of 1,2-Diethylbenzene and sum of alpha-Methylstyrene + 1,2-Diethylbenzene on sample #21180; results in mg/kg

lab	method	1,2-DeB	mark	z(targ)	Sum a-MS + 1,2-DeB	mark	z(targ)	remarks
150		-----		-----	-----		-----	
169		-----		-----	-----		-----	
171		-----		-----	-----		-----	
173		-----		-----	-----		-----	
273		-----		-----	-----		-----	
315		-----		-----	-----		-----	
317		-----		-----	-----		-----	
323		-----		-----	-----		-----	
333		-----		-----	-----		-----	
347		-----		-----	-----		-----	
357		-----		-----	-----		-----	
395		-----		-----	-----		-----	
446		-----		-----	-----		-----	
551		-----		-----	-----		-----	
557		-----		-----	-----		-----	
857		-----		-----	-----		-----	
858		-----		-----	-----		-----	
860		-----		-----	-----		-----	
863		-----		-----	-----		-----	
868		-----		-----	-----		-----	
869		-----		-----	-----		-----	
902		-----		-----	-----		-----	
913		-----		-----	-----		-----	
1117	D5135	0		-----	257.9		-----	
1135	D5135	<10		-----	221		-----	
1169		-----		-----	-----		-----	
1189		-----		-----	-----		-----	
1264		-----		-----	-----		-----	
1509		-----		-----	-----		-----	
1515		-----		-----	-----		-----	
1823		-----		-----	-----		-----	
1880		-----		-----	-----		-----	
2320		-----		-----	-----		-----	
6198		-----		-----	-----		-----	
6201		-----		-----	-----		-----	
6202	D5135	<3		-----	-----		-----	
6262		-----		-----	-----		-----	
6389		-----		-----	-----		-----	
6396	D5135	0		-----	0		-----	
6406		-----		-----	-----		-----	
7014		-----		-----	-----		-----	
9008		-----		-----	-----		-----	
	n	4						
	mean (n)	<10						

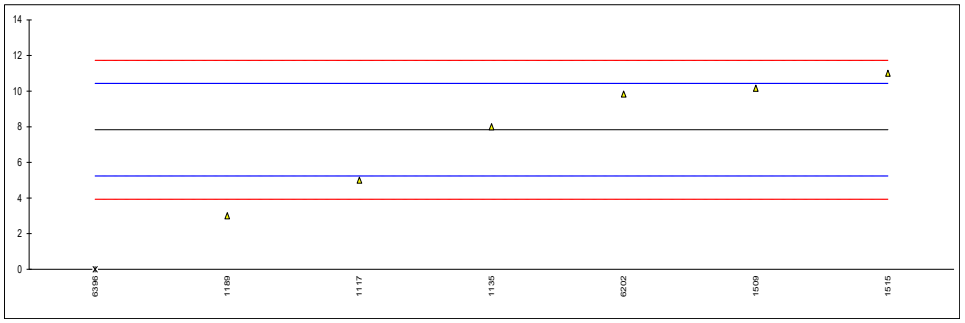
Determination of Phenylacetylene on sample #21180; results in mg/kg

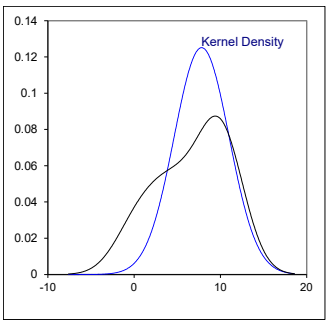
lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171		-----		-----	
173		-----		-----	
273		-----		-----	
315	D5135	<10		-----	
317		-----		-----	
323	D5135	11		-----	
333		-----		-----	
347		-----		-----	
357	D5135	< 10		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	11.32		-----	
1135	D5135	3		-----	
1169	D5135	<1		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	4.33		-----	
1515	D5135	0		-----	
1823		-----		-----	
1880	D7504	<10		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	<10		-----	
6262	D5135	<10		-----	
6389		-----		-----	
6396	D5135	0		-----	
6406		-----		-----	
7014	D5135	9.42		-----	
9008	D7504	10		-----	
	n	12			
	mean (n)	<10			

Determination of 3/4-Methylstyrenes on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171		-----		-----	
173		-----		-----	
273		-----		-----	
315		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
347		-----		-----	
357		-----		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	5		-2.18	
1135	D5135	8		0.13	
1169		-----		-----	
1189	D5135	3		-3.72	
1264		-----		-----	
1509	D5135	10.16		1.79	only 4-Methylstyrene reported for 3/4-Methylstyrenes
1515	D5135	11		2.44	
1823		-----		-----	
1880		-----		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	9.83		1.54	
6262		-----		-----	
6389		-----		-----	
6396	D5135	0	G(0.01)	-6.02	
6406		-----		-----	
7014		-----		-----	
9008		-----		-----	

normality	unknown
n	6
outliers	1
mean (n)	7.832
st.dev. (n)	3.1889
R(calc.)	8.929
st.dev.(Horwitz (n= 2))	1.3000
R(Horwitz (n= 2))	3.640

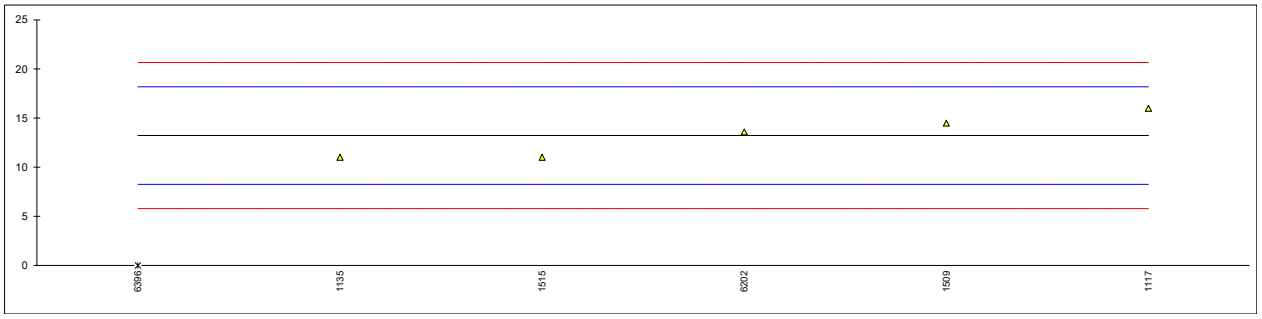




Determination of sum of Phenylacetylene + 3/4-Methylstyrenes on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171		-----		-----	
173		-----		-----	
273		-----		-----	
315		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
347		-----		-----	
357		-----		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	16		1.12	
1135	D5135	11		-0.89	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509	D5135	14.49		0.51	
1515	D5135	11		-0.89	
1823		-----		-----	
1880		-----		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	13.6		0.15	
6262		-----		-----	
6389		-----		-----	
6396	D5135	0	G(0.01)	-5.32	
6406		-----		-----	
7014		-----		-----	
9008		-----		-----	

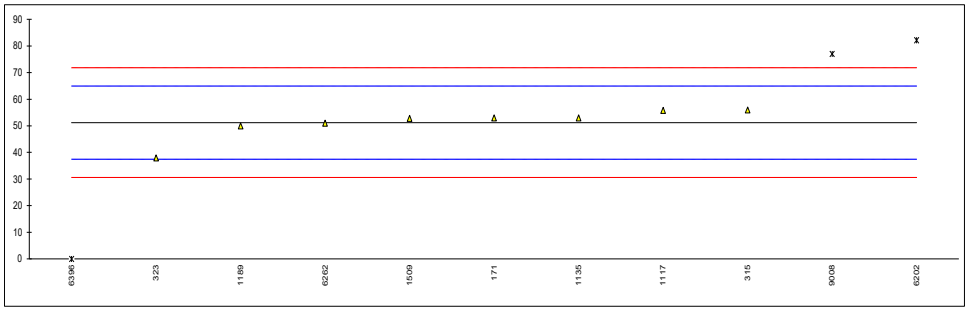
normality	unknown
n	5
outliers	1
mean (n)	13.218
st.dev. (n)	2.1990
R(calc.)	6.157
st.dev.(Horwitz (n= 3))	2.4837
R(Horwitz (n= 3))	6.954

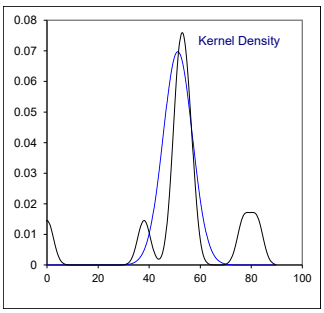


Determination of Benzaldehyde on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	53		0.26	
173		-----		-----	
273		-----		-----	
315	D5135	56		0.70	
317		-----		-----	
323	D5135	38		-1.93	
333		-----		-----	
347		-----		-----	
357		-----		-----	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	55.81		0.67	
1135	D5135	53		0.26	
1169		-----		-----	
1189	D5135	50		-0.18	
1264		-----		-----	
1509	D5135	52.79		0.23	
1515		-----		-----	
1823		-----		-----	
1880		-----		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	82.13	DG(0.05)	4.51	
6262	D5135	51	C	-0.03	first reported 32
6389		-----		-----	
6396	D5135	0	G(0.05)	-7.47	
6406		-----		-----	
7014		-----		-----	
9008	In house	77	DG(0.05)	3.76	

normality	not OK
n	8
outliers	3
mean (n)	51.200
st.dev. (n)	5.7199
R(calc.)	16.016
st.dev.(D5135:21)	6.8571
R(D5135:21)	19.200

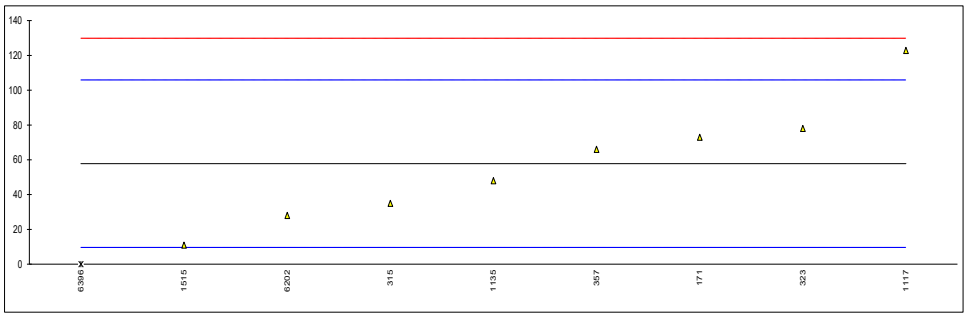


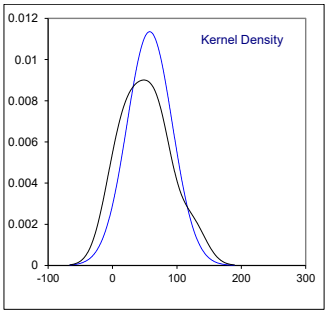


Determination of Non-aromatics on sample #21180; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150		-----		-----	
169		-----		-----	
171	D5135	73		0.63	
173		-----		-----	
273		-----		-----	
315	D5135	35		-0.95	
317		-----		-----	
323	D5135	78		0.84	
333		-----		-----	
347		-----		-----	
357	D5135	66		0.34	
395		-----		-----	
446		-----		-----	
551		-----		-----	
557		-----		-----	
857		-----		-----	
858		-----		-----	
860		-----		-----	
863		-----		-----	
868		-----		-----	
869		-----		-----	
902		-----		-----	
913		-----		-----	
1117	D5135	122.9	C	2.71	first reported 485.1
1135	D5135	48		-0.40	
1169		-----		-----	
1189		-----		-----	
1264		-----		-----	
1509		-----		-----	
1515	D5135	11		-1.94	
1823		-----		-----	
1880		-----		-----	
2320		-----		-----	
6198		-----		-----	
6201		-----		-----	
6202	D5135	28.01		-1.24	
6262		-----		-----	
6389		-----		-----	
6396	D5135	0	G(0.01)	-2.40	
6406		-----		-----	
7014		-----		-----	
9008		-----		-----	

normality	OK
n	8
outliers	1
mean (n)	57.739
st.dev. (n)	35.1281
R(calc.)	98.359
st.dev.(D5135:21)	24.0578
R(D5135:21)	67.362





APPENDIX 2

Number of participants per country

1 lab in	BANGLADESH
3 labs in	BELGIUM
2 labs in	BRAZIL
1 lab in	CANADA
8 labs in	CHINA, People's Republic
1 lab in	FINLAND
1 lab in	FRANCE
1 lab in	INDIA
1 lab in	INDONESIA
1 lab in	IRAN, Islamic Republic of
1 lab in	ITALY
2 labs in	KUWAIT
6 labs in	NETHERLANDS
1 lab in	SAUDI ARABIA
1 lab in	SINGAPORE
1 lab in	SOUTH AFRICA
1 lab in	SPAIN
1 lab in	SRI LANKA
1 lab in	TURKEY
1 lab in	UNITED KINGDOM
6 labs in	UNITED STATES OF AMERICA

APPENDIX 3

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

Literature

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12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)