Results of Proficiency Test
Free and Released
Formaldehyde in textile
November 2019

CONTENTS

1   INTRODUCTION

Since 2008, the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for Free Formaldehyde in textile every year. This proficiency scheme was extended with a PT for Released Formaldehyde in 2013. During the annual proficiency testing program 2019/2020, it was decided to continue the proficiency test for the analysis of Free and Released Formaldehyde in textile.
In this interlaboratory study 187 laboratories in 40 different countries registered for participation. See appendix 3 for the number of participating laboratories per country.
In this report, the results of the 2019 Free and Released Formaldehyde in textile 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 two different textile samples of 5 grams each and labelled #19635 and #19636. Both samples are positive on Formaldehyde.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for the statistical evaluation.

2.1   QUALITY SYSTEM

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, has implemented a quality system based on ISO/IEC17043:2010. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2   PROTOCOL

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

2.3   CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

Two batches of textile were obtained from third party laboratories. The first batch was a pink colored cotton. The second batch was a red colored viscose. Each batch was cut finely, well mixed and divided over 220 subsamples of 5 grams each and respectively labelled #19635 and #19636. Each sample was packed in a polypropylene bag and wrapped in aluminum foil. The homogeneity of the subsamples was checked by the determination of Free Formaldehyde on 7 stratified randomly selected samples of each set.

	Sample #19635	Sample #19636
	Free Formaldehyde in mg/kg	Free Formaldehyde in mg/kg
Sample 1	38.78	972.2
Sample 2	41.95	972.1
Sample 3	39.08	1018.9
Sample 4	38.08	1041.6
Sample 5	39.62	1051.9
Sample 6	38.16	1029.7
Sample 7	41.69	999.3

Table 1: homogeneity test results of subsamples #19635 and #19636

From the above test results, the relative between sample standard deviations RSD_r were calculated and compared with 0.3 times the corresponding reproducibilities of the reference method in agreement with the procedure of ISO 13528, Annex B2 in the next table.

	Sample #19635	Sample #19636
	Free Formaldehyde	Free Formaldehyde
RSD_r (observed)	4.0%	3.2%
reference method	Horwitz	Horwitz
0.3 x RSD_R (reference method)	2.8%	1.7%
0.3 x RSD_R (previous PTs)	4.3%	3.1%

Table 2: evaluation of the relative standard deviations of subsamples #19635 and #19636

The calculated relative standard deviations RSD_r for both samples were not in agreement with 0.3 times the corresponding RSD_R estimated using the Horwitz equation, but they did meet 0.3 times the RSD_R from previous proficiency tests (see chapter 4.3, table 6). Therefore, the homogeneity of all subsamples was assumed.

To each of the participating laboratories one subsample of #19635 and one subsample of #19636 were sent on October 9, 2019.

2.5 ANALYSES

The participants were requested to determine Free Formaldehyde content and the Released Formaldehyde content on samples #19635 and #19636.
It was also requested to report if the laboratory was accredited for the requested components that were determined and to report some analytical details.

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

To get comparable results, a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the appropriate reference test method 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-cts. 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-cts/. The reported test results are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

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

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation, the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<…' or '>…' were not used in the statistical evaluation.

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

According to ISO 5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value, the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1 as met for all evaluated tests, therefore, the uncertainty of all assigned values maybe 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. The Kernel Density Graph is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve was projected over the Kernel Density Graph for reference.

3.3   Z-SCORES

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

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. In some cases, a reproducibility based on former iis proficiency tests could be used.

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

The z-scores were calculated according to:

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

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

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

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

4   EVALUATION

During the execution of this proficiency test no problems were encountered with the delivery of the samples. Four laboratories did not report any test results and six laboratories reported the results after the final reporting date.
Finally, the 183 reporting laboratories sent in total 489 numerical test results. Observed were 11 outlying test results, which is 2.2% of the numerical test results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

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

4.1   EVALUATION PER SAMPLE AND PER TEST

In this paragraph, the test results are discussed per sample and per test.
The test methods, which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These methods are also in the table together with the original data. The abbreviations, used in these tables, are listed in appendix 4.

The method for determination of the Free Formaldehyde is specified in the Standards of the Ecolabelling Institutes. It should be noticed that ISO14184-1 corresponds to the Japanese method specified in the Japanese Law 112 and is described in the Japanese Standard JIS L1096.

In test methods ISO14184-1:11 and ISO14184-2:11 some information on precision data is given. In table B.1 of ISO14184-1 and table C.2 of ISO14184-2 precision values are mentioned, but they were obtained using slightly different methods than the ISO14184 methods. Therefore, it was concluded that reliable reproducibility data cannot be estimated form the ISO14184 test methods. Therefore, target reproducibilities were estimated from the Horwitz equation and used for statistical evaluation.

Sample #19635

Free Formaldehyde content: This determination was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the estimated reproducibility using the Horwitz equation.

Released Formaldehyde: 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 estimated reproducibility using the Horwitz equation.

Sample #19636

Free Formaldehyde content: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the estimated reproducibility using the Horwitz equation.

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

4.2   PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Component	unit	n	average	2.8 * sd	R (target)
Free Formaldehyde	mg/kg	177	46.8	11.7	11.8
Released Formaldehyde	mg/kg	64	87.1	20.8	19.9

Table 3: reproducibilities of components on sample #19635

Component	unit	n	average	2.8 * sd	R (target)
Free Formaldehyde	mg/kg	174	545	101	95
Released Formaldehyde	mg/kg	63	973	209	155

Table 4: reproducibilities of components on sample #19636

Without further statistical calculations, the group of participating laboratories have only some difficulties with the analysis of Released Formaldehyde of sample #19636. The analyzes of Free and Release Formaldehyde is compared with the strict requirements of the Horwitz equation. See also the discussions in paragraphs 4.4 and 6.

4.3   COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2019 WITH PREVIOUS PTS

	November 2019	November 2018	November 2017	November 2016	November 2015
Number of reporting labs	183	185	184	192	192
Number of results reported	489	512	511	452	415
Number of statistical outliers	11	11	15	26	14
Percentage outliers	2.2%	2.1%	2.9%	5.8%	3.4%

Table 5: Comparison with previous PTs

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

The performance of the determinations of the proficiency test was compared expressed as relative standard deviation (RSD) of the PTs, see below table.

	November 2019	November 2018	November 2017	November 2016	2009 - 2015
Free Formaldehyde	7-9%	12-13%	9-10%	8-9%	7-15%
Released Formaldehyde	8-9%	11%	7-8%	9-10%	9-10%

Table 6: Comparison of the uncertainties over the years

The uncertainties observed in this PT for Free and Released Formaldehyde are smaller compared to the uncertainties observed in previous PTs.

4.4   EVALUATION OF ANALYTICAL DETAILS

The reported analytical details that were reported by the participants are listed in appendix 2. About 85% of the participating laboratories reported to be accredited for the determination of Free and Released Formaldehyde in textile.

For this PT the intake for both samples was requested. It appeared that no effect was observed for different sample intake on the reported test results for Free and Released Formaldehyde.
It was also requested to mention if the Dimedone confirmation test was performed. About 83% reported to have done the Dimedone test to verify the positive test results of the Formaldehyde determination.
Remarkably, some participants mentioned to have corrected for Dimedone, which is not part of ISO14184-1.

5   DISCUSSION

In this PT, the average of the homogeneity test results is not in line with the average (consensus value) from the PT results. There are several reasons for this. First, the goal of the homogeneity testing is different from the goal of the evaluation of the reported PT results. In order to prove the homogeneity of the PT samples, a test method is selected with a high precision (smallest variation). The accuracy (trueness) of the test method is less relevant. Secondly, the homogeneity testing is done by one laboratory only. The test results of this ISO/IEC17025 accredited laboratory will have a bias (systematic deviation) depending on the test method used. The desire to detect small variations between the PT samples leads to the use of a sensitive test method with high precision, which may be a test method with significant bias.
Also, each test result reported by the laboratories that participate in the PT will have a bias. However, some will have a positive bias and others a negative bias. These different biases compensate each other in the PT average (consensus value). Therefore, the PT consensus value may deviate from the average of the homogeneity test. At the same time the accuracy of the PT consensus value is more reliable than the accuracy of the average of the homogeneity test.

When the results of this interlaboratory study were compared to the Ecolabelling Standards and Requirements for Textiles in EU and with the similar Bluesign® BSSL, it was noticed that not all participants would make identical decisions about the acceptability of the textiles for the determined parameters.

Ecolabel	baby clothes	Oeko-Tex 103 in direct skin contact	Oeko-Tex 103 no direct skin contact
Bluesign® BSSL	next to skin use	occasional skin contact	no skin contact
Free Formaldehyde extractable (mg/kg)	<16	75	300
Released Formaldehyde (mg/m^3)	0.1	0.1	0.1

Table 9: Bluesign® BSSL and Ecolabelling Standards and Requirements for Textiles in EU

Extractable Free Formaldehyde
For sample #19635, all of the reporting laboratories would have accepted the sample for the category: "in direct skin contact" (<75 mg/kg) but would have rejected it for the category "baby clothes" and "next to skin use" (<16 mg/kg), except for one laboratory.

For sample #19636, All of the reporting laboratories would have rejected for the category: "no direct skin contact" (<300 mg/kg) and "in direct skin contact" (<75 mg/kg), except for three laboratories that would have accepted it for the sample for the category "in direct skin contact" (<75 mg/kg). All reporting laboratories would have rejected the sample for the category: "baby clothes" (<16 mg/kg).

Released Formaldehyde
No conclusions can be drawn, as the limits mentioned in the Ecolabel Standard have a different unit compared with test method ISO14184-2:11 (mg/m^3 vs mg/kg).

6   CONCLUSION

In this proficiency test the Free Formaldehyde and the Released Formaldehyde contents were determined. The variation observed for Free Formaldehyde and Released Formaldehyde in this interlaboratory study are in line with observations in the previous proficiency tests. A possible explanation for the variation could be the preparation or the conditioning of the sample and/or by the performance of the analysis by the laboratory (e.g. correction for Dimedone).

Each laboratory should evaluate its performance in this study and make decisions about necessary corrective actions. Therefore, participation on a regular basis in this scheme could be helpful to improve the performance and thus increase of the quality of the analytical results.
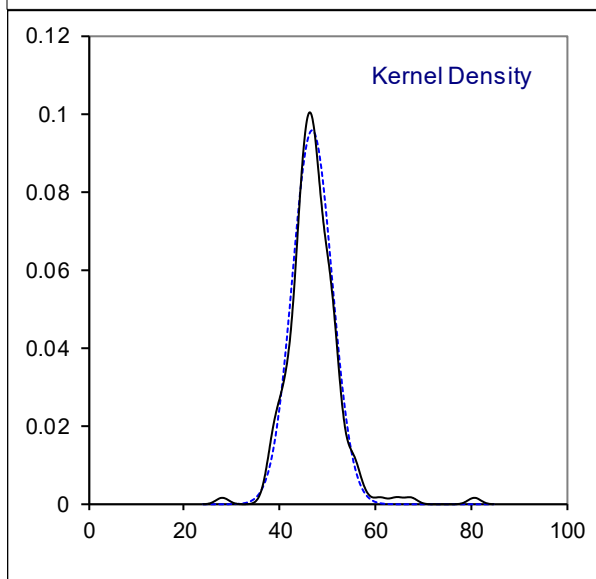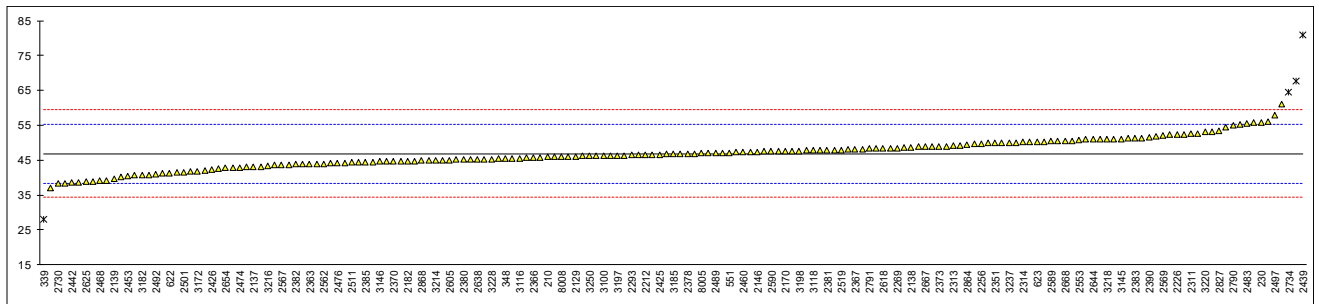
APPENDIX 1

Determination of Free Formaldehyde content on sample #19635; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
210	ISO14184-1	45.98		-0.20	2404	ISO14184-1	52.3		1.30
230	ISO14184-1	55.89		2.15	2410		-----		-----
339	ISO14184-1	28	R(0.01)	-4.49	2415	ISO14184-1	40.3		-1.56
348	In house	45.47		-0.33	2425	ISO14184-1	46.6		-0.06
362	ISO14184-1	38.44		-2.00	2426	ISO14184-1	42.2		-1.10
523	ISO14184-1	43.80		-0.72	2429	ISO14184-1	52.54		1.36
551	ISO14184-1	47.0999		0.06	2433	ISO14184-1	47.77		0.22
622	ISO14184-1	41.26	C	-1.33	2439	ISO14184-1	80.87	R(0.01)	8.10
623	ISO14184-1	50.3		0.82	2442	ISO14184-1	38.69		-1.94
840	ISO14184-1	42.6		-1.01	2449		-----		-----
1124	ISO14184-1	53.1		1.49	2452	ISO14184-1	49.0		0.51
1213	ISO14184-1	44.2		-0.63	2453	ISO14184-1	40.4		-1.53
1910	ISO14184-1	44.51		-0.55	2454	ISO14184-1	51.4		1.09
2102	In house	41.99		-1.15	2456	ISO14184-1	44.075		-0.66
2115	ISO14184-1	43.5		-0.80	2457		-----		-----
2118	ISO14184-1	50.08		0.77	2460	JISL1041	47.2		0.09
2129	ISO14184-1	46.1		-0.18	2462	ISO14184-1	48.3		0.35
2132	ISO14184-1	46.3		-0.13	2467	ISO14184-1	67.55	R(0.01)	4.93
2137	ISO14184-1	43		-0.91	2468	ISO14184-1	39		-1.87
2138	ISO14184-1	48.7		0.44	2474	ISO14184-1	42.9		-0.94
2139	ISO14184-1	39.6		-1.72	2475	ISO14184-1	47.8		0.23
2146	ISO14184-1	47.38		0.13	2476	ISO14184-1	44.1		-0.65
2159	ISO14184-1	39.18		-1.82	2482	ISO14184-1	45.14		-0.40
2165	ISO14184-1	45.40		-0.34	2483	ISO14184-1	55.5		2.06
2166	In house	46.72		-0.03	2489	ISO14184-1	47		0.04
2170	ISO14184-1	47.64		0.19	2492	ISO14184-1	41.0		-1.39
2182	ISO14184-1	44.8		-0.49	2494	ISO14184-1	51.4		1.09
2184	ISO14184-1	47.2		0.09	2497	ISO14184-1	57.89		2.63
2201	ISO14184-1	50.30		0.82	2501	ISO14184-1	41.56		-1.26
2212	JISL1041	46.5		-0.08	2506		-----		-----
2225	ISO14184-1	47.08		0.06	2511	ISO14184-1	44.3		-0.60
2226	ISO14184-1	52.28		1.30	2518	ISO14184-1	47.55		0.17
2236		-----		-----	2519	ISO14184-1	47.8		0.23
2241	ISO14184-1	45.55		-0.31	2536	ISO14184-1	44.00		-0.68
2245	ISO14184-1	47.64		0.19	2549	ISO14184-1	49		0.51
2256	ISO14184-1	49.7		0.68	2553	ISO14184-1	50.87		0.96
2265	ISO14184-1	44.8		-0.49	2561	ISO14184-1	41.2		-1.34
2266	ISO14184-1	61.1		3.40	2562	GB/T2912	44		-0.68
2269	ISO14184-1	48.48		0.39	2563	ISO14184-1	46.7		-0.03
2273	ISO14184-1	45.28		-0.37	2567	ISO14184-1	43.5		-0.80
2275	ISO14184-1	50.9		0.97	2569	ISO14184-1	52		1.23
2279	ISO14184-1	48.1		0.30	2572	ISO14184-1	48.39		0.37
2284	ISO14184-1	47.8		0.23	2582	ISO14184-1	51.0255		1.00
2289	ISO14184-1	54.4		1.80	2589	ISO14184-1	50.38		0.84
2290	ISO14184-1	46.32		-0.12	2590	ISO14184-1	47.49		0.15
2293	ISO14184-1	46.46		-0.09	2591	In house	41.421		-1.29
2301	ISO14184-1	44.92		-0.46	2598	ISO14184-1	48.77		0.46
2310	ISO14184-1	50.2		0.80	2605	GB/T2912	45.0		-0.44
2311	ISO14184-1	52.48		1.34	2609	ISO14184-1	45.2		-0.39
2313	ISO14184-1	49.12		0.54	2615	ISO14184-1	56.12		2.21
2314	ISO14184-1	50.1		0.78	2618	ISO14184-1	48.32		0.35
2330	ISO14184-1	41.74		-1.21	2625	ISO14184-1	38.77		-1.92
2347	ISO14184-1	45		-0.44	2638	ISO14184-1	45.231	C	-0.38
2351	ISO14184-1	50		0.75	2643	ISO14184-1	48.53		0.40
2356	ISO14184-1	50.4		0.85	2644	ISO14184-1	51	C	0.99
2358	ISO14184-1	47.2		0.09	2648	GB/T2912	48.2		0.32
2363	ISO14184-1	44		-0.68	2649	ISO14184-1	40.58		-1.49
2364	ISO14184-1	47.0		0.04	2654	ISO14184-1	42.8		-0.96
2365	ISO14184-1	46.54		-0.07	2667	ISO14184-1	48.812		0.47
2366	ISO14184-1	45.8		-0.25	2668	ISO14184-1	50.44		0.86
2367	ISO14184-1	48.2		0.32	2673	ISO14184-1	46.8		-0.01
2369	ISO14184-1	45.64		-0.29	2674	ISO14184-1	44.8		-0.49
2370	ISO14184-1	44.70		-0.51	2678	ISO14184-1	44.470		-0.56
2373	ISO14184-1	49.0		0.51	2703	ISO14184-1	38.9		-1.89
2375	ISO14184-1	49.2		0.56	2730	ISO14184-1	38.43		-2.00
2378	GB/T2912	46.8		-0.01	2734	ISO14184-1	64.5	C,R(0.01)	4.20
2379	ISO14184-1	46.09		-0.18	2737	ISO14184-1	50.6		0.90
2380	ISO14184-1	45.2		-0.39	2789	ISO14184-1	38.7		-1.94
2381	ISO14184-1	47.80		0.23	2790	ISO14184-1	55.0		1.94
2382	ISO14184-1	43.8		-0.72	2791	ISO14184-1	48.28		0.34
2383	GB/T2912	51.4		1.09	2802		43.1		-0.89
2385	ISO14184-1	44.5		-0.56	2804	JISL1041	47.467		0.15
2390	ISO14184-1	51.5		1.11	2812	ISO14184-1	42.99		-0.92
2401	GB/T2912	50.0		0.75	2826	ISO14184-1	46		-0.20
2403	ISO14184-1	49.6		0.66	2827	ISO14184-1	53.31		1.54

lab	method	Value	mark	z(targ)	lab	method	value	mark	z(targ)
2864	CNS155808-1	49.39		0.61	3195	ISO14184-1	46.3		-0.13
2868	ISO14184-1	44.86		-0.47	3197	ISO14184-1	46.3		-0.13
2877		-----		-----	3198	ISO14184-1	47.66		0.20
2889	ISO14184-1	52.25		1.29	3207	JISL1041	40.6		-1.49
2903	ISO14184-1	37.08		-2.32	3210	ISO14184-1	43.67		-0.75
3100	ISO14184-1	46.3		-0.13	3214	ISO14184-1	44.92		-0.46
3110	In house	46.2		-0.15	3216	ISO14184-1	43.4		-0.82
3116	ISO14184-1	45.56		-0.30	3218	ISO14184-1	51.0		0.99
3118	ISO14184-1	47.786		0.23	3220	ISO14184-1	53.03		1.47
3134	ISO14184-1	51.94		1.21	3225	ISO14184-1	46.48		-0.09
3145	ISO14184-1	51.1		1.01	3228	ISO14184-1	45.3		-0.37
3146	ISO14184-1	44.59		-0.54	3232	ISO14184-1	55.84		2.14
3153	ISO14184-1	42.89		-0.94	3237	ISO14184-1	50		0.75
3154	ISO14184-1	44.6688		-0.52	3248	GB/T2912	45.8		-0.25
3172	ISO14184-1	41.75		-1.21	3250	ISO14184-1	46.26		-0.14
3174	ISO14184-1	51		0.99	6191	ISO14184-1	55.2		1.99
3176	ISO14184-1	49.975		0.75	8005	JISL1041	46.98		0.03
3182	ISO14184-1	40.6		-1.49	8008	ISO14184-1	46.0		-0.20
3185	ISO14184-1	46.7		-0.03					

normality	OK		
n	177		
outliers	4		
mean (n)	46.839	RSD = 9%	
st.dev. (n)	4.1625		
R(calc.)	11.655		
st.dev.(Horwitz)	4.2003		
R(Horwitz)	11.761		

Lab 622: First reported 34.93
Lab 2638: First reported 60.265
Lab 2644: First reported 61
Lab 2734: First reported 185.42

Kernel Density

Determination of Released Formaldehyde content on sample #19635; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
210		-----		-----	2404		-----		-----
230	ISO14184-2	102.85		2.22	2410		-----		-----
339		-----		-----	2415		-----		-----
348		-----		-----	2425	ISO14184-2	87.5		0.06
362		-----		-----	2426		-----		-----
523		-----		-----	2429	ISO14184-2	88.98		0.27
551		-----		-----	2433		-----		-----
622	ISO14184-2	79.51	C	-1.06	2439		-----		-----
623	ISO14184-2	83.3		-0.53	2442	ISO14184-2	82.26		-0.68
840	ISO14184-2	99.2		1.70	2449		-----		-----
1124		-----		-----	2452		-----		-----
1213		-----		-----	2453		-----		-----
1910		-----		-----	2454	ISO14184-2	89.2		0.30
2102		-----		-----	2456		-----		-----
2115		-----		-----	2457	ISO14184-2	88.6		0.21
2118		-----		-----	2460		-----		-----
2129		-----		-----	2462		-----		-----
2132		-----		-----	2467		-----		-----
2137		-----		-----	2468	ISO14184-2	90	C	0.41
2138		-----		-----	2474	ISO14184-2	83.1		-0.56
2139		-----		-----	2475		-----		-----
2146		-----		-----	2476		-----		-----
2159	ISO14184-2	76.45		-1.49	2482		-----		-----
2165		-----		-----	2483		-----		-----
2166		-----		-----	2489	ISO14184-2	80.3		-0.95
2170		-----		-----	2492		-----		-----
2182		-----		-----	2494	ISO14184-2	80.1		-0.98
2184		-----		-----	2497		-----		-----
2201	ISO14184-2	91.48		0.62	2501		-----		-----
2212		-----		-----	2506	ISO14184-2	76	C	-1.56
2225		-----		-----	2511		-----		-----
2226		-----		-----	2518		-----		-----
2236		-----		-----	2519		-----		-----
2241		-----		-----	2536		-----		-----
2245		-----		-----	2549	ISO14184-2	88.8		0.24
2256		-----		-----	2553	ISO14184-2	93.58		0.91
2265		-----		-----	2561		-----		-----
2266		-----		-----	2562		-----		-----
2269		-----		-----	2563		-----		-----
2273		-----		-----	2567		-----		-----
2275	ISO14184-2	88.9		0.26	2569	ISO14184-2	86		-0.15
2279		-----		-----	2572		-----		-----
2284		-----		-----	2582		-----		-----
2289	ISO14184-2	96.4		1.31	2589		-----		-----
2290		-----		-----	2590		-----		-----
2293		-----		-----	2591		-----		-----
2301	ISO14184-2	96.25	C	1.29	2598		-----		-----
2310	ISO14184-2	80.1		-0.98	2605	GB/T2912	91.1		0.56
2311	ISO14184-2	82.11		-0.70	2609		-----		-----
2313	ISO14184-2	84.74		-0.33	2615		-----		-----
2314	ISO14184-2	84.1		-0.42	2618	ISO14184-2	84.15		-0.41
2330	ISO14184-2	82.13		-0.70	2625	AATCC112	65.94	C	-2.97
2347	ISO14184-2	93		0.83	2638	ISO14184-2	88.84		0.25
2351	ISO14184-2	80		-1.00	2643		-----		-----
2356	ISO14184-2	90.4		0.47	2644		-----		-----
2358	ISO14184-2	86.2		-0.12	2648		-----		-----
2363		-----		-----	2649	ISO14184-2	79.70		-1.04
2364	ISO14184-2	81.5		-0.78	2654		-----		-----
2365	ISO14184-2	94.73		1.08	2667		-----		-----
2366	ISO14184-2	91.6		0.64	2668	ISO14184-2	89.65		0.36
2367	ISO14184-2	84.1		-0.42	2673		-----		-----
2369	ISO14184-2	93.54		0.91	2674		-----		-----
2370	ISO14184-2	88.98		0.27	2678		-----		-----
2373	ISO14184-2	85.1		-0.28	2703		-----		-----
2375	ISO14184-2	80.01		-0.99	2730		-----		-----
2378	GB/T2912	87.5		0.06	2734		-----		-----
2379	ISO14184-2	77.27		-1.38	2737	ISO14184-2	87		-0.01
2380	ISO14184-2	95.3		1.16	2789		-----		-----
2381	ISO14184-2	98.20		1.56	2790		-----		-----
2382		-----		-----	2791	ISO14184-2	81.51		-0.78
2383	GB/T2912	82.6		-0.63	2802		-----		-----
2385	ISO14184-2	86.0		-0.15	2804		-----		-----
2390	ISO14184-2	109.7		3.18	2812		-----		-----
2401		-----		-----	2826		-----		-----
2403		-----		-----	2827	ISO14184-2	85.10		-0.28

lab	method	Value	mark	z(targ)	lab	method	value	mark	z(targ)
2864		-----		-----	3195		-----		-----
2868		-----		-----	3197	ISO14184-2	85.2		-0.26
2877		-----		-----	3198		-----		-----
2889		-----		-----	3207		-----		-----
2903		-----		-----	3210		-----		-----
3100	ISO14184-2	90.2		0.44	3214		-----		-----
3110		-----		-----	3216		-----		-----
3116		-----		-----	3218		-----		-----
3118	AATCC112	70.815		-2.29	3220	ISO14184-2	87.89		0.11
3134	ISO14184-2	95.90		1.24	3225		-----		-----
3145		-----		-----	3228		-----		-----
3146		-----		-----	3232	ISO14184-2	80.83	C	-0.88
3153		-----		-----	3237		-----		-----
3154		-----		-----	3248		-----		-----
3172		-----		-----	3250	ISO14184-2	92.92	C	0.82
3174		-----		-----	6191		-----		-----
3176	ISO14184-2	96.880		1.38	8005		-----		-----
3182	ISO14184-2	47.4	R(0.01)	-5.58	8008		-----		-----
3185	ISO14184-2	91.9		0.68					

normality	suspect		
n	64		
outliers	1		
mean (n)	87.081	RSD = 9%	
st.dev. (n)	7.4144		
R(calc.)	20.760		
st.dev.(Horwitz)	7.1131		
R(Horwitz)	19.917		

Lab 622: First reported 18.13
Lab 2301: First reported 133.00
Lab 2468: First reported 112
Lab 2506: First reported 33.8
Lab 2625: First reported 131.89
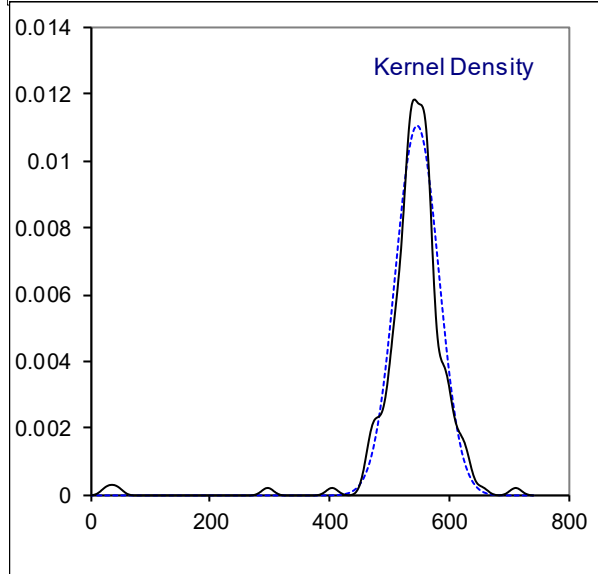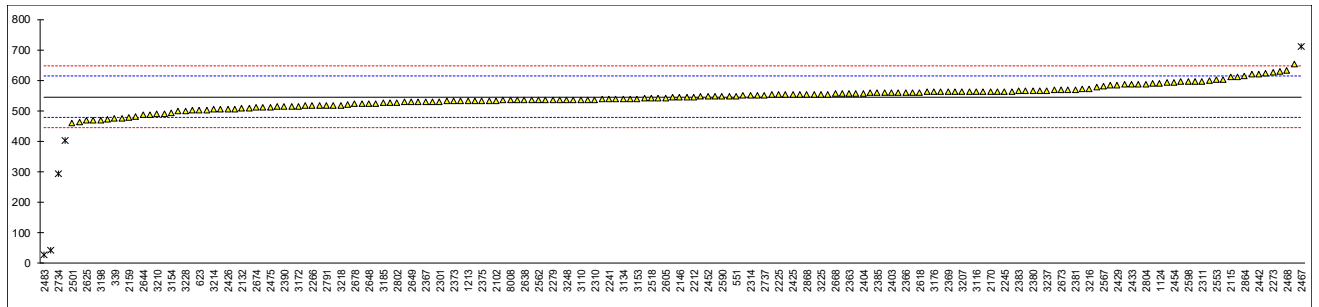Lab 3232: First reported 585.47
Lab 3250: First reported 128.92
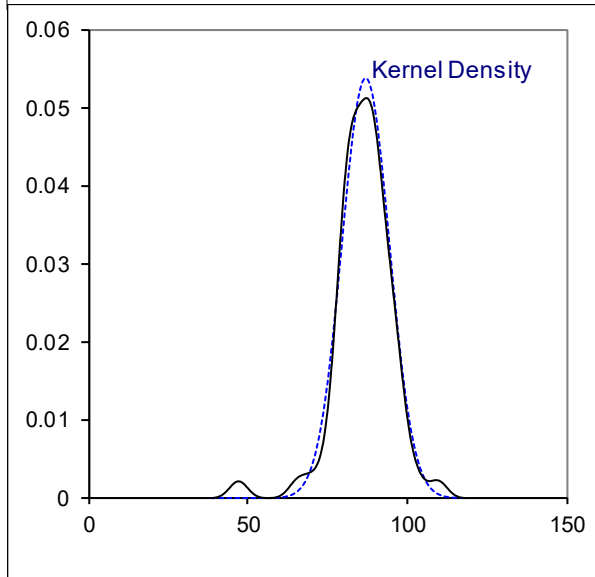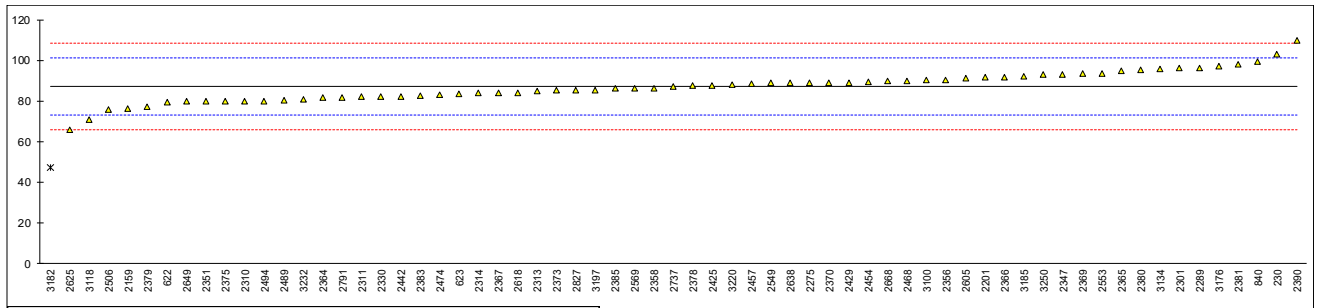
Determination of Free Formaldehyde content on sample #19636; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
210		-----		-----	2404	ISO14184-1	557.5		0.36
230	ISO14184-1	622.80		2.29	2410		-----		-----
339	ISO14184-1	474		-2.11	2415	ISO14184-1	530.9		-0.43
348	In house	597.19		1.54	2425	ISO14184-1	552.4		0.21
362	ISO14184-1	562.41		0.51	2426	ISO14184-1	505.4		-1.18
523	ISO14184-1	469.59		-2.24	2429	ISO14184-1	585.00		1.18
551	ISO14184-1	548.7162	C	0.10	2433	ISO14184-1	585.65		1.19
622	ISO14184-1	507.78	C	-1.11	2439	ISO14184-1	612.12		1.98
623	ISO14184-1	501.9		-1.28	2442	ISO14184-1	620.16		2.22
840	ISO14184-1	518.5		-0.79	2449		-----		-----
1124	ISO14184-1	591.1		1.36	2452	ISO14184-1	547.0		0.05
1213	ISO14184-1	531.9		-0.40	2453	ISO14184-1	498.1		-1.40
1910	ISO14184-1	516.08		-0.86	2454	ISO14184-1	592.3		1.39
2102	In house	533.55		-0.35	2456	ISO14184-1	463.74	C	-2.41
2115	ISO14184-1	610		1.91	2457		-----		-----
2118	ISO14184-1	553.01		0.23	2460	JISL1041	560.0		0.44
2129	ISO14184-1	535.4		-0.29	2462	ISO14184-1	544.8		-0.01
2132	ISO14184-1	506.9		-1.14	2467	ISO14184-1	710.17	R(0.01)	4.88
2137	ISO14184-1	501		-1.31	2468	ISO14184-1	632		2.57
2138	ISO14184-1	488.5		-1.68	2474	ISO14184-1	567.7		0.66
2139	ISO14184-1	480.4	C	-1.92	2475	ISO14184-1	512.3		-0.98
2146	ISO14184-1	544.69		-0.02	2476	ISO14184-1	598.2		1.57
2159	ISO14184-1	478.0		-1.99	2482	ISO14184-1	505.1		-1.19
2165	ISO14184-1	505.99		-1.16	2483	ISO14184-1	26.5	C,R(0.01)	-15.35
2166	In house	554.85		0.28	2489	ISO14184-1	602.5		1.69
2170	ISO14184-1	563.66		0.54	2492	ISO14184-1	557.2		0.35
2182	ISO14184-1	540.3		-0.15	2494	ISO14184-1	628.4		2.46
2184	ISO14184-1	524.5		-0.62	2497	ISO14184-1	562.31		0.50
2201	ISO14184-1	592.22		1.39	2501	ISO14184-1	459.74		-2.53
2212	JISL1041	545.1		-0.01	2506	ISO14184-1	43	C,R(0.01)	-14.86
2225	ISO14184-1	552.25		0.21	2511	ISO14184-1	514.9		-0.90
2226	ISO14184-1	653.86	C	3.21	2518	ISO14184-1	540.80		-0.13
2236		-----		-----	2519	ISO14184-1	553.1		0.23
2241	ISO14184-1	538.5		-0.20	2536	ISO14184-1	586.30		1.21
2245	ISO14184-1	564.20		0.56	2549	ISO14184-1	564.2		0.56
2256	ISO14184-1	531.7		-0.40	2553	ISO14184-1	601.23		1.66
2265	ISO14184-1	533.4		-0.35	2561	ISO14184-1	403.0	R(0.05)	-4.21
2266	ISO14184-1	516.4		-0.85	2562	GB/T2912	535		-0.30
2269	ISO14184-1	531.21		-0.42	2563	ISO14184-1	547.3		0.06
2273	ISO14184-1	627.15		2.42	2567	ISO14184-1	581.75		1.08
2275	ISO14184-1	582.9		1.11	2569	ISO14184-1	570		0.73
2279	ISO14184-1	535.4		-0.29	2572	ISO14184-1	534.16		-0.33
2284		-----		-----	2582	ISO14184-1	503.7440		-1.23
2289	ISO14184-1	578.4		0.98	2589	ISO14184-1	564.19		0.56
2290	ISO14184-1	521.41		-0.71	2590	ISO14184-1	547.96		0.08
2293	ISO14184-1	565.91		0.61	2591	In house	536.967		-0.25
2301	ISO14184-1	530.97		-0.42	2598	ISO14184-1	596.52		1.52
2310	ISO14184-1	537		-0.25	2605	GB/T2912	542.5		-0.08
2311	ISO14184-1	597.34		1.54	2609	ISO14184-1	539.4		-0.17
2313	ISO14184-1	532.2		-0.39	2615	ISO14184-1	560.76		0.46
2314	ISO14184-1	550.5		0.15	2618	ISO14184-1	561.10		0.47
2330	ISO14184-1	530.14		-0.45	2625	ISO14184-1	469.13		-2.25
2347	GB/T2912	559		0.41	2638	ISO14184-1	534.915		-0.31
2351	ISO14184-1	548		0.08	2643	ISO14184-1	535.55		-0.29
2356	ISO14184-1	572.8		0.81	2644	ISO14184-1	486		-1.75
2358	ISO14184-1	538.4		-0.20	2648	GB/T2912	523.8		-0.64
2363	ISO14184-1	557		0.35	2649	ISO14184-1	530.12		-0.45
2364	ISO14184-1	535.0		-0.30	2654	ISO14184-1	517.5		-0.82
2365	ISO14184-1	563.27		0.53	2667	ISO14184-1	562.058		0.50
2366	ISO14184-1	560.5		0.45	2668	ISO14184-1	555.41		0.30
2367	ISO14184-1	530.2		-0.45	2673	ISO14184-1	568.5		0.69
2369	ISO14184-1	562.35		0.50	2674	ISO14184-1	510.2		-1.04
2370	GB/T2912	522.9		-0.66	2678	ISO14184-1	522.130		-0.69
2373	ISO14184-1	531.5		-0.41	2703	ISO14184-1	534.6		-0.32
2375	ISO14184-1	533.2		-0.36	2730	ISO14184-1	526.04		-0.57
2378	GB/T2912	546.8		0.04	2734	ISO14184-1	295.2	C,R(0.01)	-7.40
2379	ISO14184-1	541.58		-0.11	2737	ISO14184-1	551.4		0.18
2380	ISO14184-1	565.9		0.61	2789	ISO14184-1	555.9		0.31
2381	ISO14184-1	570.20		0.74	2790		-----	W	-----
2382	ISO14184-1	550.2		0.15	2791	ISO14184-1	518.17		-0.80
2383	GB/T2912	565.0		0.58	2802		527.6		-0.52
2385	ISO14184-1	559		0.41	2804		588.4		1.28
2390	ISO14184-1	514.7		-0.91	2812	ISO14184-1	473.11		-2.14
2401	GB/T2912	544.0		-0.04	2826	ISO14184-1	540		-0.16
2403	ISO14184-1	560.1		0.44	2827	ISO14184-1	552.22		0.21

lab	method	Value	mark	z(targ)	lab	method	value	mark	z(targ)
2864	CNS15580-1	613.00		2.00	3195	ISO14184-1	491		-1.61
2868	ISO14184-1	553.01		0.23	3197	ISO14184-1	596.3		1.51
2877		-----		-----	3198	ISO14184-1	470.55		-2.21
2889	ISO14184-1	560.25		0.44	3207	JISL1041	563		0.52
2903	ISO14184-1	510.67		-1.02	3210	ISO14184-1	489.60		-1.65
3100	ISO14184-1	528.9		-0.49	3214	ISO14184-1	504.48		-1.21
3110	In house	536.9		-0.25	3216	ISO14184-1	573	C	0.82
3116	ISO14184-1	563.35		0.53	3218	ISO14184-1	518.9		-0.78
3118	ISO14184-1	550.643		0.16	3220	ISO14184-1	619.99		2.21
3134	ISO14184-1	539.86		-0.16	3225	ISO14184-1	553.37		0.24
3145	ISO14184-1	513.2		-0.95	3228	ISO14184-1	500.7		-1.32
3146	ISO14184-1	552.3		0.21	3232	ISO14184-1	585.47	C	1.19
3153	ISO14184-1	540.05		-0.16	3237	ISO14184-1	566		0.61
3154	ISO14184-1	494.389		-1.51	3248	GB/T2912	535.7		-0.28
3172	ISO14184-1	515.4		-0.88	3250	ISO14184-1	536.34		-0.26
3174	ISO14184-1	591		1.35	6191	ISO14184-1	474.5	C	-2.09
3176	ISO14184-1	562.060		0.50	8005	JISL1041	565.83		0.61
3182	ISO14184-1	563.5		0.54	8008	ISO14184-1	534.4		-0.32
3185	ISO14184-1	525.4		-0.59					

normality	OK	
n	174	
outliers	5	
mean (n)	545.291	RSD = 7%
st.dev. (n)	36.1850	
R(calc.)	101.318	
st.dev.(Horwitz)	33.7944	
R(Horwitz)	94.624	

Lab 551: First reported 648.3235
Lab 622: First reported 223.08
Lab 2139: First reported 395.2
Lab 2226: First reported 678.02
Lab 2456: First reported 436.74
Lab 2483: First reported 670

Lab 2506: First reported 24.4
Lab 2734: First reported 900.25
Lab 2790: Test result withdrawn, reported 668.5
Lab 3216: First reported 642.2
Lab 3232: First reported 80.83
Lab 6191: First reported 448.9

Kernel Density

Determination of Released Formaldehyde content on sample #19636; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
210		-----		-----	2404		-----		-----
230	ISO14184-2	1079.36		1.93	2410		-----		-----
339		-----		-----	2415		-----		-----
348		-----		-----	2425	ISO14184-2	1005.8		0.59
362		-----		-----	2426		-----		-----
523		-----		-----	2429	ISO14184-2	1004.35		0.57
551		-----		-----	2433		-----		-----
622	ISO14184-2	765.14	C	-3.76	2439		-----		-----
623	ISO14184-2	871.5		-1.84	2442	ISO14184-2	894.76		-1.41
840	ISO14184-2	950.6		-0.40	2449		-----		-----
1124		-----		-----	2452		-----		-----
1213		-----		-----	2453		-----		-----
1910		-----		-----	2454	ISO14184-2	1055.1		1.49
2102		-----		-----	2456		-----		-----
2115		-----		-----	2457	ISO14184-2	824.7		-2.68
2118		-----		-----	2460		-----		-----
2129		-----		-----	2462		-----		-----
2132		-----		-----	2467		-----		-----
2137		-----		-----	2468	ISO14184-2	996	C	0.42
2138		-----		-----	2474	ISO14184-2	1049.3		1.38
2139		-----		-----	2475		-----		-----
2146		-----		-----	2476		-----		-----
2159	ISO14184-2	861.46		-2.02	2482		-----		-----
2165		-----		-----	2483		-----		-----
2166		-----		-----	2489	ISO14184-2	1040.5		1.22
2170		-----		-----	2492		-----		-----
2182		-----		-----	2494	ISO14184-2	905.8		-1.21
2184		-----		-----	2497		-----		-----
2201	ISO14184-2	1046.96		1.34	2501		-----		-----
2212		-----		-----	2506		-----		-----
2225		-----		-----	2511		-----		-----
2226		-----		-----	2518		-----		-----
2236		-----		-----	2519		-----		-----
2241		-----		-----	2536		-----		-----
2245		-----		-----	2549	ISO14184-2	961.4		-0.21
2256		-----		-----	2553	ISO14184-2	1058.90		1.56
2265		-----		-----	2561		-----		-----
2266		-----		-----	2562		-----		-----
2269		-----		-----	2563		-----		-----
2273		-----		-----	2567		-----		-----
2275	ISO14184-2	1054.1		1.47	2569	ISO14184-2	910		-1.14
2279		-----		-----	2572		-----		-----
2284		-----		-----	2582		-----		-----
2289	ISO14184-2	1060.9		1.59	2589		-----		-----
2290		-----		-----	2590		-----		-----
2293		-----		-----	2591		-----		-----
2301	ISO14184-2	1097.50	C	2.25	2598		-----		-----
2310	ISO14184-2	851		-2.21	2605	GB/T2912	968.2		-0.09
2311	ISO14184-2	981.78		0.16	2609		-----		-----
2313	ISO14184-2	890.4		-1.49	2615		-----		-----
2314	ISO14184-2	905.6		-1.22	2618	ISO14184-2	1002.65		0.54
2330	ISO14184-2	961.86		-0.20	2625	AATCC112	814.68	C	-2.86
2347	GB/T2912	955		-0.32	2638	ISO14184-2	964.42		-0.15
2351	ISO14184-2	1008		0.63	2643		-----		-----
2356	ISO14184-2	996.4		0.42	2644		-----		-----
2358	ISO14184-2	932.1		-0.74	2648		-----		-----
2363		-----		-----	2649	ISO14184-2	896.52		-1.38
2364	ISO14184-2	1070.0		1.76	2654		-----		-----
2365	ISO14184-2	961.72		-0.20	2667		-----		-----
2366	ISO14184-2	953.8		-0.35	2668	ISO14184-2	950.81		-0.40
2367	ISO14184-2	995.8		0.41	2673		-----		-----
2369	ISO14184-2	959.56		-0.24	2674		-----		-----
2370	ISO14184-2	956.4		-0.30	2678		-----		-----
2373	ISO14184-2	1040.6		1.22	2703		-----		-----
2375	ISO14184-2	902.2		-1.28	2730		-----		-----
2378	GB/T2912	1013.1		0.73	2734		-----		-----
2379	ISO14184-2	980.88		0.14	2737	ISO14184-2	950.7		-0.40
2380	ISO14184-2	1013.7		0.74	2789		-----		-----
2381	ISO14184-2	1018.90		0.83	2790		-----		-----
2382		-----		-----	2791	ISO14184-2	915.48		-1.04
2383	GB/T2912	994.3		0.39	2802		-----		-----
2385	ISO14184-2	990		0.31	2804		-----		-----
2390	ISO14184-2	1173.0		3.62	2812		-----		-----
2401		-----		-----	2826		-----		-----
2403		-----		-----	2827	ISO14184-2	984.10		0.20

lab	method	Value	mark	z(targ)	lab	method	value	mark	z(targ)
2864		-----		-----	3195		-----		-----
2868		-----		-----	3197	ISO14184-2	1016.9		0.80
2877		-----		-----	3198		-----		-----
2889		-----		-----	3207		-----		-----
2903		-----		-----	3210		-----		-----
3100	ISO14184-2	938.2		-0.63	3214		-----		-----
3110		-----		-----	3216		-----		-----
3116		-----		-----	3218		-----		-----
3118	AATCC112	998.205		0.46	3220	ISO14184-2	925.45		-0.86
3134	ISO14184-2	970.80		-0.04	3225		NA		-----
3145		-----		-----	3228		-----		-----
3146		-----		-----	3232	ISO14184-2	901.40		-1.29
3153		-----		-----	3237		-----		-----
3154		-----		-----	3248		-----		-----
3172		-----		-----	3250	ISO14184-2	1101.07		2.32
3174		-----		-----	6191		-----		-----
3176	ISO14184-2	1056.885		1.52	8005		-----		-----
3182	ISO14184-2	612.8	R(0.01)	-6.52	8008		-----		-----
3185	ISO14184-2	937.4		-0.64					

normality	OK		
n	63		
outliers	1		
mean (n)	972.922	RSD = 8%	
st.dev. (n)	74.6928		
R(calc.)	209.140		
st.dev.(Horwitz)	55.2647		
R(Horwitz)	154.741		

Lab 622: First reported 336.14
Lab 2301: First reported 1423.80
Lab 2468: First reported 1400
Lab 2625: First reported 1629.37
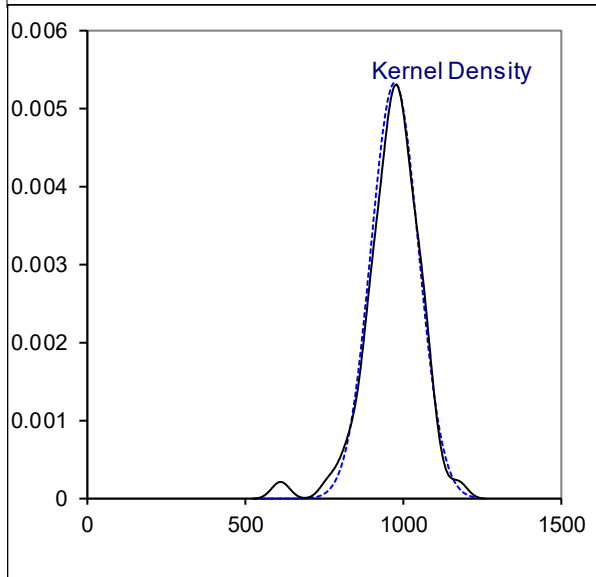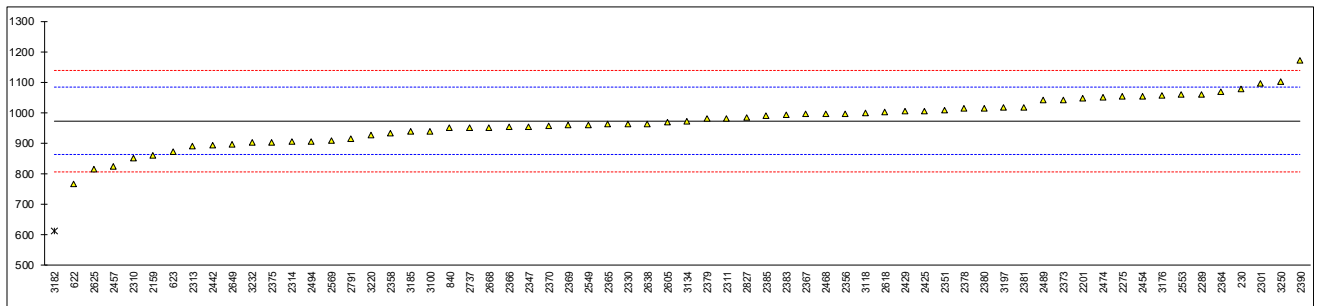
APPENDIX 2 Analytical details

lab	ISO/IEC 17025 accredited	Sample Intake Free Form. (grams)	Sample Intake Released Form. (grams)	Dimedone confirmation test	Dimedone confirmation done because of
210	Yes			---	
230	Yes	1	1	Yes	
339	---			---	
348	Yes	1		Yes	
362	Yes			Yes	In the sample 19636 the high absorption may be due to other positive compounds for formaldehyde reaction.
523	Yes	1		Yes	None
551	Yes			Yes	
622	Yes	1	1	Yes	To make sure that the absorption is only due to formaldehyde, not because of some extracted coloring-agents.
623	Yes	1	1	Yes	All positive result by UV needs to be confirmed by Dimedone
840	Yes	2	3	Yes	color affection
1124	Yes	2		Yes	
1213	Yes	1		Yes	
1910	Yes	1		Yes	There was a doubt that the absorption may not be due to formaldehyde. Sample extracts were colorful (light pink for #19635 and red for #19636)
2102	Yes	1		Yes	
2115	---			---	
2118	Yes	1		Yes	
2129	Yes			---	
2132	Yes	1	1	Yes	
2137	Yes	1		Yes	
2138	Yes	1		Yes	
2139	Yes	4.3	2	Yes	
2146	Yes	1.5		Yes	
2159	Yes	1	1	Yes	There was a doubt that the absorption might not be due to formaldehyde. Therefore, we carried out confirmation test.
2165	Yes	1		Yes	
2166	Yes	1		Yes	
2170	Yes	1		Yes	Sample size was not enough to conduct the released form. test
2182	Yes	2.5		Yes	
2184	Yes	1		Yes	
2201	Yes	1	1	Yes	
2212	Yes	1		---	
2225	Yes	1		Yes	
2226	Yes	2.5		Yes	
2236	---			---	
2241	Yes	2.5		Yes	the formaldehyde is too high
2245	Yes	1		Yes	
2256	Yes	1		Yes	
2265	Yes	1		Yes	
2266	Yes	1.37		Yes	
2269	Yes	1		Yes	If there is a doubt that the absorption may not be due to formaldehyde but for example to an extracted coloring agent.
2273	Yes	1		Yes	
2275	Yes	1	1	Yes	it is some discoloration.
2279	Yes	5	0	Yes	The extracted of #19636 with color agent.
2284	Yes	5		Yes	
2289	Yes	1	1	Yes	
2290	---			---	
2293	Yes	2.5		Yes	Some interference from color was seen
2301	Yes	1	1	Yes	to check interference
2310	Yes	1	1	Yes	
2311	Yes	1	1	Yes	
2313	Yes	1	1	Yes	
2314	Yes	0.5	0.5	Yes	
2330	Yes	0.5	0.5	Yes	
2347	Yes			---	
2351	Yes	2	2	Yes	there is an extracted coloring agent for sample #19636
2356	Yes	1	1	Yes	a little discoloration of the red sample#19636.
2358	No	1	1	Yes	
2363	Yes	1		Yes	
2364	Yes	1	1	Yes	According to the standard (ISO 14184-1)
2365	Yes	3	7	Yes	

lab	ISO/IEC 17025 accredited	Sample Intake Free Form. (grams)	Sample Intake Released Form. (grams)	Dimedone confirmation test	Dimedone confirmation done because of
2366	Yes	0.5	0.5	Yes	positive results
2367	Yes	1	1	Yes	
2369	Yes			Yes	
2370	Yes	1	1	Yes	
2373	Yes	1	1	Yes	
2375	Yes	0.503	1.0036	Yes	
2378	Yes	1	1	Yes	
2379	Yes	0.5	1	Yes	To confirm that it is really formaldehyde.
2380	Yes	1	1	Yes	
2381	Yes	1	1	Yes	
2382	Yes	1		Yes	
2383	Yes	1	1	Yes	the extract solution has color
2385	Yes	1	1	Yes	
2390	Yes	1.0064	1.0069	Yes	because red color found in extract after filtration
2401	Yes	1		Yes	
2403	Yes	2		Yes	
2404	Yes	2		---	
2410	---			---	
2415	Yes	1		Yes	Because extracted solution has color.
2425	Yes	1	1	Yes	
2426	Yes	1		Yes	-
2429	Yes	1	1	Yes	
2433	Yes	1		Yes	To confirm that the absorption is due to formaldehyde.
2439	Yes			Yes	
2442	Yes	1.0064	0.5052	Yes	
2449	---			---	
2452	Yes	1		Yes	for verification, we notice that the solution wasn't totally discolored which reflects the presence of interferences.
2453	Yes	1.5		Yes	
2454	Yes	1	1	Yes	Because the extract solution contains formaldehyde, we need to confirm the absorption is due to formaldehyde or not.
2456	Yes	1.012		Yes	aqueous extract was colored.
2457	Yes		1	Yes	
2460	Yes	1		---	None
2462	Yes	2		Yes	Check if it contains acetaldehyde
2467	No	1		---	
2468	Yes	1	1	Yes	
2474	Yes	1	1	Yes	
2475	Yes			---	
2476	---			---	
2482	Yes	1		Yes	
2483	Yes	1		Yes	
2489	Yes	1.25	1	Yes	
2492	Yes	0.5		Yes	We perform confirmation test for every positive results.
2494	Yes	1	1	Yes	
2497	Yes	2		Yes	
2501	Yes			Yes	
2506	Yes	4	2	Yes	Because a colored extract was obtained. The absorption may be due to extracted coloring agent and not to formaldehyde.
2511	---			---	
2518	No	1		Yes	The yellow color may caused by fading of the sample, to check if the absorption was due to formaldehyde.
2519	No	1		Yes	
2536	Yes	1.0022		Yes	Default procedure for formaldehyde confirmation.
2549	Yes	1	1	Yes	Nil
2553	Yes	1.0025	1.0018	Yes	
2561	No	2.5		Yes	
2562	Yes	1	1	Yes	
2563	Yes	1		Yes	
2567	Yes	1		Yes	(for sample #19636): color leeching is observed
2569	Yes	1	1	---	
2572	---			---	
2582	Yes	1		Yes	
2589	Yes	1		Yes	Because the sample solution of #19636 is colored.
2590	Yes	1.25		Yes	
2591	Yes	1		Yes	
2598	Yes	1.004		Yes	

lab	ISO/IEC 17025 accredited	Sample Intake Free Form. (grams)	Sample Intake Released Form. (grams)	Dimedone confirmation test	Dimedone confirmation done because of
2605	Yes	2	2	Yes	Diff. in abs between the dimedone/sample blank was near zero.
2609	Yes	1		Yes	
2615	Yes	1		Yes	
2618	Yes	1	1	Yes	
2625	Yes			---	
2638	No	0.8	0.8	Yes	Free formaldehyde test has red color. so we perform the test.
2643	Yes	1		Yes	
2644	Yes	1		Yes	Always Dimedone test if a positive result is detected
2648	---			---	
2649	Yes	1	1	Yes	the sample is pink colored, this can affect the test
2654	Yes	1		Yes	
2667	---			---	
2668	---			---	
2673	Yes	1		Yes	
2674	Yes	1		Yes	
2678	---			---	
2703	Yes	1		Yes	for #19636 because the extraction solution was colored
2730	No	1		Yes	for confirmation sample 19636
2734	Yes	4	0	Yes	
2737	Yes	0.5	0.5	Yes	
2789	Yes	1		Yes	Dimedone confirmation is performed for each result >16mg/kg
2790	---			---	
2791	Yes	1	1	Yes	
2802	Yes	1		---	
2804	Yes	1		Yes	
2812	Yes	1		Yes	
2826	No	0.5		Yes	The extracted solution is not colorless.
2827	Yes	1	1	Yes	
2864	Yes	1		Yes	
2868	Yes	1		Yes	
2877	---			---	
2889	Yes	2		Yes	Control Check with Dimedone to check the method
2903	Yes	1		Yes	Sample extracts were colorful.
3100	Yes	1	1	Yes	
3110	Yes	0.5		Yes	
3116	Yes	1		---	
3118	Yes	1	1	Yes	To confirm that the absorption is due to formaldehyde.
3134	No	0.5	0.5	Yes	
3145	Yes	1		Yes	
3146	Yes	0.9		Yes	
3153	Yes	1		Yes	
3154	Yes	1		Yes	
3172	Yes	1		Yes	
3174	Yes	2		Yes	
3176	Yes	0.5	0.5	Yes	
3182	Yes	1	1	Yes	
3185	Yes	1	1	Yes	
3195	Yes	3.5	0	Yes	Due to the coloration of the eluate.
3197	Yes	1	1	Yes	
3198	Yes	2.5		Yes	Because of release color to the extract.
3207	---			---	
3210	Yes	1		Yes	
3214	Yes	1		Yes	
3216	Yes	1		Yes	
3218	---			---	
3220	Yes	1	1	Yes	
3225	Yes	0.5	0	Yes	Avoid false positive results.
3228	Yes	1		Yes	
3232	Yes	1	1	Yes	
3237	---			---	
3248	Yes	1	1	Yes	To ensure the net formaldehyde content.
3250	Yes	1.0006	1.0044	Yes	Perform dimedone for confirmation interference.
6191	No	1	0	Yes	To confirm if result is above LQ..
8005	Yes	1		---	
8006	Yes	0.5		Yes	

APPENDIX 3

Number of participants per country

```
 7 labs in BANGLADESH
 1 lab in BELGIUM
 1 lab in BRAZIL
 1 lab in BULGARIA
 3 labs in CAMBODIA
 1 lab in CZECH REPUBLIC
 1 lab in EGYPT
 1 lab in FINLAND
 6 labs in FRANCE
11 labs in GERMANY
 1 lab in GREECE
 1 lab in GUATEMALA
18 labs in HONG KONG
13 labs in INDIA
 6 labs in INDONESIA
 7 labs in ITALY
 1 lab in LATVIA
 2 labs in MAURITIUS
 3 labs in MEXICO
 2 labs in MOROCCO
 1 lab in NETHERLANDS
45 labs in P.R. of CHINA
 5 labs in PAKISTAN
 1 lab in PHILIPPINES
 2 labs in POLAND
 1 lab in PORTUGAL
 1 lab in ROMANIA
 1 lab in SERBIA
 1 lab in SINGAPORE
 1 lab in SLOVENIA
 6 labs in SOUTH KOREA
 4 labs in SPAIN
 2 labs in SRI LANKA
 5 labs in TAIWAN R.O.C.
 4 labs in THAILAND
 3 labs in TUNISIA
 6 labs in TURKEY
 2 labs in U.S.A.
 3 labs in UNITED KINGDOM
 6 labs in VIETNAM
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APPENDIX 4

Abbreviations:

C	= final 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
n.a.	= not applicable
n.d.	= not detected
n.e.	= not evaluated
W	= test result withdrawn on request of participant
ex	= test result excluded from the statistical evaluations

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9.   ISO105 E4:94.
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11. ISO13528:05.
12. M. Thompson and R. Wood. J. AOAC Int. 76. 926. (1993).
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15. Official Journal of the European Communities L133/29: May 2002.
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