Institute for
Interlaboratory Studies

Results of Proficiency Test
Free and Released
Formaldehyde in Textile
November 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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CONTENTS

1 INTRODUCTION

Since 2013 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the determination of Free and Released Formaldehyde in Textile every year. During the annual proficiency testing program 2022/2023 it was decided to continue the proficiency test for the determination of Free and Released Formaldehyde in Textile.

In this interlaboratory study 152 laboratories in 33 countries registered for participation. See appendix 3 for the number of participants per country.
In this report the results of the 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 approximately 5 grams each labelled #22755 and #22756.
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 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

For the first sample a batch of brown cotton was selected which contains Formaldehyde. After cutting and homogenization 210 small plastic bags were filled with approximately 5 grams each and labelled #22755. Each subsample was wrapped in aluminum foil and packed again in a small plastic bag.
The homogeneity of the subsamples was checked by the determination of Free Formaldehyde in accordance with ISO14184-1 on 10 stratified randomly selected subsamples.

	Free Formaldehyde in mg/kg
sample #22755-1	52.7
sample #22755-2	54.3
sample #22755-3	52.5
sample #22755-4	53.2
sample #22755-5	54.6
sample #22755-6	53.0
sample #22755-7	53.0
sample #22755-8	55.2
sample #22755-9	53.3
sample #22755-10	52.2

Table 1: homogeneity test results of subsamples #22755

From the above test results the repeatability was calculated and compared with 0.3 times the estimated reproducibility calculated with the Horwitz equation in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Free Formaldehyde in mg/kg
r (observed)	2.7
reference method	Horwitz
0.3 x R (reference method)	3.9

Table 2: evaluation of the repeatability of subsamples #22755

The calculated repeatability is in agreement with 0.3 times the estimated reproducibility calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

For the second sample a batch of blue cotton was selected which contains Formaldehyde. After cutting and homogenization 210 small plastic bags were filled with approximately 5 grams each and labelled #22756. Each subsample was wrapped in aluminum foil and packed again in a small plastic bag.
The homogeneity of the subsamples was checked by the determination of Formaldehyde in accordance with ISO14184-1 on 7 stratified randomly selected subsamples.

	Free Formaldehyde in mg/kg
sample #22756-1	53.9
sample #22756-2	51.4
sample #22756-3	52.3
sample #22756-4	52.3
sample #22756-5	54.8
sample #22756-6	54.7
sample #22756-7	53.4

Table 3: homogeneity test results of subsamples #22756

From the above test results the repeatability was calculated and compared with 0.3 times the estimated reproducibility calculated with the Horwitz equation in agreement with the procedure of ISO13528, Annex B2 in the next table.

	Free Formaldehyde in mg/kg
r (observed)	3.6
reference method	Horwitz
0.3 x R (reference method)	3.9

Table 4: evaluation of the repeatability of subsamples #22756

The calculated repeatability is in agreement with 0.3 times the estimated reproducibility calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

To each of the participating laboratories one textile sample labelled #22755 and one textile sample labelled #22756 was sent on October 5, 2022.

2.5 ANALYZES

The participants were requested to determine Free and Released Formaldehyde on both PT samples. It was requested not to use less than 0.5 gram per determination to ensure homogeneity. It was also requested to report if the laboratory was accredited for the reported components 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 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-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/. 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, 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

In this proficiency test some problems were encountered with the dispatch of the samples. Nine participants reported test results after the final reporting date and one other participant did not report any test results. Not all participants were able to report all parameters requested.
In total 151 participants reported 437 numerical test results. Observed were 6 outlying test results, which is 1.4%. In proficiency tests 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 SAMPLE AND PER TEST

In this section the reported 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 test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 4.

The method for determination of the Free Formaldehyde is specified in the Standards of the Ecolabelling Institutes. It should be noted 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 obtained by (slightly) different methods than mentioned in both ISO14184 methods. Therefore, it was concluded that reliable reproducibility data cannot be obtained from test methods ISO14184-1 and -2:11. Therefore, the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

sample #22755

Free Formaldehyde: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation.

Released Formaldehyde: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation.

sample #22756

Free Formaldehyde: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated reproducibility calculated with 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 agreement with the estimated reproducibility calculated with 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 reproducibility calculated with the Horwitz equation 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 reference methods are presented in the next table.

Component	unit	n	average	2.8 * sd	R(target)
Free Formaldehyde	mg/kg	146	73.6	16.1	17.3
Released Formaldehyde	mg/kg	67	126.3	24.1	27.3

Table 5: reproducibilities of tests on sample #22755

Component	unit	n	average	2.8 * sd	R(target)
Free Formaldehyde	mg/kg	150	67.8	15.6	16.1
Released Formaldehyde	mg/kg	68	109.1	19.6	24.1

Table 6: reproducibilities of tests on sample #22756

Without further statistical calculations it can be concluded that for all determinations there is a good compliance of the group of participants with the reference method.

4.3 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2022 WITH PREVIOUS PTS

	November 2022	November 2021	November 2020	November 2019	November 2018
Number of reporting laboratories	151	183	174	183	185
Number of test results	437	529	705	489	512
Number of statistical outliers	6	12	15	11	11
Percentage of statistical outliers	1.4%	2.3%	2.1%	2.2%	2.1%

Table 7: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared to uncertainties observed in iis PTs over the years, expressed as relative standard deviation (RSD) of the PTs, see next table.

	November 2022	November 2021	November 2020	November 2019	2018 - 2013
Free Formaldehyde	8%	7%	6-9%	7-9%	8-13%
Released Formaldehyde	6-7%	8-9%	8-10%	8-9%	7-22%

Table 8: comparison of the uncertainties over the years

The uncertainties observed in this PT for Free and Released Formaldehyde are in line with the uncertainties observed in previous iis PTs.

4.4 EVALUATION OF ANALYTICAL DETAILS

For this PT some analytical details were requested which are listed in appendix 2. Based on the answers given by the participants the following can be summarized:

- A majority (about 95%) of the participants mentioned that they are ISO/IEC17025 accredited to determine the reported component(s).
- About 85% used approximately 1 grams of sample intake.
- About 70% did not confirm the Formaldehyde test result with the Dimedone test.

No further sub analysis is performed because all of the observed reproducibilities are in line with the target reproducibilities.

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® RSL, it was noticed that not all participants would make identical decisions about the acceptability of the textiles for the determined components, see next table.

Ecolabel	baby clothes	in direct skin contact	no direct skin contact
Oeko-Tex® 100	<16 mg/kg	<75 mg/kg	<150 mg/kg
Bluesign® RSL	<15 mg/kg	<75 mg/kg	<300 mg/kg

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

sample #22755
For the category “baby clothes” all reporting laboratories would have rejected the sample.
For the category “in direct skin contact” about 35% of the reporting laboratories would have rejected the sample for free formaldehyde while this is 100% for released formaldehyde.
For the category “no direct skin contact” all of the reporting laboratories would have accepted the sample for free formaldehyde and released formaldehyde, except for three laboratories. These three laboratories would have rejected the sample for released formaldehyde based on Oeko-Tex®100.

sample #22756
For the category “baby clothes” all reporting laboratories would have rejected the sample.
For the category “in direct skin contact” about 10% of the reporting laboratories would have rejected the sample for free formaldehyde while all laboratories would reject for released formaldehyde.
For the category “no direct skin contact” all of the reporting laboratories would have accepted the sample,

6 CONCLUSION

Each participating laboratory will have to evaluate its performance in this study and decide about any corrective actions if necessary. 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.

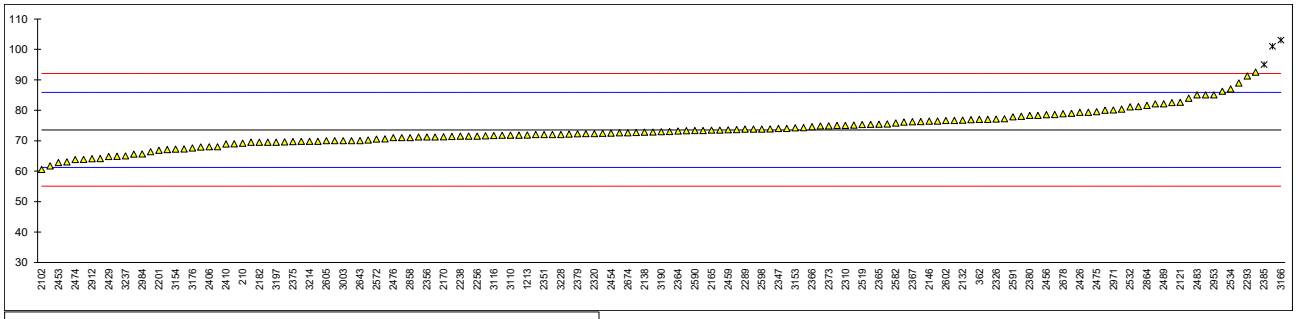
APPENDIX 1

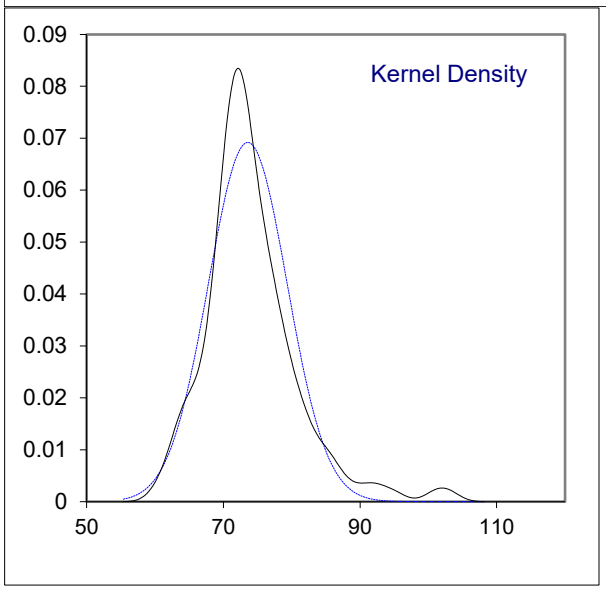
Determination of Free Formaldehyde on sample #22755; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	ISO14184-1	69.18		-0.71	
339	ISO14184-1	76.67		0.50	
362	ISO14184-1	76.98		0.55	
623	ISO14184-1	64.11		-1.54	
840	ISO14184-1	73.46		-0.02	
841	ISO14184-1	72.0		-0.26	
1213	ISO14184-1	71.85		-0.28	
2102	In house	60.54		-2.12	
2115	ISO14184-1	63.0		-1.72	
2121		82.6		1.46	
2132	ISO14184-1	76.7688		0.52	
2137	ISO14184-1	78.57		0.81	
2138	ISO14184-1	72.79		-0.13	
2146	ISO14184-1	76.40		0.46	
2159	ISO14184-1	70.6		-0.48	
2165	ISO14184-1	73.447		-0.02	
2170	ISO14184-1	71.28		-0.37	
2182	ISO14184-1	69.5		-0.66	
2184	ISO14184-1	71.6		-0.32	
2201	ISO14184-1	66.86		-1.09	
2226	ISO14184-1	83.96		1.68	
2236	ISO14184-1	70.21		-0.55	
2238	ISO14184-1	71.47		-0.34	
2255	ISO14184-1	71.2		-0.39	
2256	ISO14184-1	71.50		-0.34	
2264		-----		-----	
2265	ISO14184-1	63.84		-1.58	
2269	ISO14184-1	66.34		-1.17	
2275	ISO14184-1	71.37		-0.36	
2289	ISO14184-1	73.8		0.04	
2290	ISO14184-1	69.5		-0.66	
2293	ISO14184-1	91.26		2.87	
2301	ISO14184-1	72.99		-0.10	
2310	ISO14184-1	75		0.23	
2311	ISO14184-1	76.90		0.54	
2313	ISO14184-1	76.26		0.43	
2314	ISO14184-1	79.32		0.93	
2320	ISO14184-1	72.32		-0.20	
2325	ISO14184-1	80.4		1.11	
2326	ISO14184-1	77.08		0.57	
2330	ISO14184-1	68.96		-0.75	
2347	ISO14184-1	74		0.07	
2350	ISO14184-1	73.29		-0.05	
2351	ISO14184-1	72		-0.26	
2356	ISO14184-1	71.2		-0.39	
2358	ISO14184-1	78		0.72	
2360	ISO14184-1	71.5		-0.34	
2363	ISO14184-1	73.8		0.04	
2364	ISO14184-1	73.2		-0.06	
2365	ISO14184-1	75.40		0.29	
2366	ISO14184-1	74.6		0.16	
2367	ISO14184-1	76.22		0.43	
2370	ISO14184-1	72.47		-0.18	
2372	ISO14184-1	72.7		-0.14	
2373	ISO14184-1	74.86		0.21	
2375	ISO14184-1	69.7		-0.63	
2378	GB/T2912	72		-0.26	
2379	ISO14184-1	72.2738		-0.21	
2380	ISO14184-1	78.3		0.77	
2381	ISO14184-1	75.50		0.31	
2382	ISO14184-1	75.0		0.23	
2385	ISO14184-1	95	R(0.05)	3.47	
2406	ISO14184-1	68.0		-0.91	
2410	ISO14184-1	68.9		-0.76	
2423	ISO14184-1	72.60		-0.16	
2426	ISO14184-1	79.3		0.93	
2429	ISO14184-1	64.8		-1.42	
2442		-----		-----	
2453	ISO14184-1	62.81		-1.75	
2454	ISO14184-1	72.5		-0.18	
2456	ISO14184-1	78.54		0.80	
2459	ISO14184-1	73.57		0.00	
2474	ISO14184-1	63.8		-1.59	
2475	ISO14184-1	79.5		0.96	

lab	method	value	mark	z(targ)	remarks
2476	ISO14184-1	71.0		-0.42	
2483	ISO14184-1	85.0		1.85	
2489	ISO14184-1	82.10		1.38	
2492	ISO14184-1/GB/T2912-1	72.82		-0.12	
2495	ISO14184-1	77.011		0.56	
2511	ISO14184-1	78.3		0.77	
2514	ISO14184-1	71.00		-0.42	
2515	ISO14184-1	67.1		-1.05	
2519	ISO14184-1	75.3		0.28	
2527	ISO14184-1	73.64		0.01	
2532	ISO14184-1	81.1		1.22	
2534	ISO14184-1	87.01		2.18	
2561	ISO14184-1	71.2		-0.39	
2567	ISO14184-1	67.3		-1.02	
2572	ISO14184-1	70.5		-0.50	
2582	ISO14184-1	75.7726		0.36	
2590	ISO14184-1	73.300		-0.05	
2591	ISO14184-1	77.8196		0.69	
2598	ISO14184-1	73.8		0.04	
2602	ASU B82.02-1	76.6		0.49	
2605	ISO14184-1	70.0		-0.58	
2618	ISO14184-1	82.490		1.44	
2629	ISO14184-1	79.0		0.88	
2638	ISO14184-1	69.77		-0.62	
2643	ISO14184-1	70.05		-0.57	
2644	ISO14184-1	101	R(0.01)	4.45	
2674	ISO14184-1	72.6		-0.16	
2678	ISO14184-1	78.85		0.85	
2763	ISO14184-1	81.2		1.24	
2779	ISO14184-1	85.0		1.85	
2826	ISO14184-1	74.8		0.20	
2858	ISO14184-1	71.00		-0.42	
2864	ISO14184-1	81.57		1.30	
2867	ISO14184-1	73.3		-0.05	
2908		-----	W	-----	Test result withdrawn, reported 98.15
2912	ISO14184-1	64.1		-1.54	
2921	JIS L1041	76.40		0.46	
2926	ISO14181.1	64.84		-1.42	
2950	ISO14184-1	61.71		-1.93	
2953	ISO14184-1	85.02		1.86	
2955	ISO14184-1	75.1		0.25	
2960	ISO14184-1	72.15		-0.23	
2971	ISO14184-1	80.1		1.06	
2976	ISO14184-1	70		-0.58	
2977	ISO14184-1	82.05		1.37	
2984	ISO14184-1	65.6092		-1.29	
2989	ISO14184-1	76.1350		0.41	
2991	GB/T2910.1	92.5		3.07	
3003	ISO14184-1	70.00		-0.58	
3100	JIS L1041	69.5		-0.66	
3110	ISO14184-1	71.8		-0.29	
3116	ISO14184-1	71.68		-0.31	
3118	ISO14184-1	73.85		0.04	
3149	ISO14184-1	80.0		1.04	
3153	ISO14184-1	74.23		0.10	
3154	ISO14184-1	67.219		-1.03	
3160	ISO14184-1	71.821		-0.29	
3166	In house	103	R(0.01)	4.77	
3172	ISO14184-1	71.772		-0.29	
3176	JIS L1041	67.6	C	-0.97	First reported 33.87
3182	ISO14184-1	77.2		0.59	
3185	ISO14184-1	69.62		-0.64	
3186	ISO14184-1	88.96		2.49	
3190	ISO14184-1	72.92		-0.11	
3197	ISO14184-1	69.50		-0.66	
3198	ISO14184-1	67.89		-0.92	
3207	JIS L1041	68		-0.91	
3210	In house	65.58		-1.30	
3214	ISO14184-1	69.79		-0.62	
3218	ISO14184-1	74.29		0.11	
3225	ISO14184-1	75.36		0.29	
3228	ISO14184-1	72		-0.26	
3230	In house	86.21		2.05	
3232	ISO14184-1	70.00		-0.58	
3237	ISO14184-1	65		-1.39	
3248	GB/T2912	74		0.07	
8005	JIS L1041	72.30		-0.21	
8008	JTS ST1.6	69.8		-0.61	

normality	OK	
n	146	
outliers	3	
mean (n)	73.583	
st.dev. (n)	5.7652	RSD = 8%
R(calc.)	16.143	
st.dev.(Horwitz)	6.1648	
R(Horwitz)	17.261	



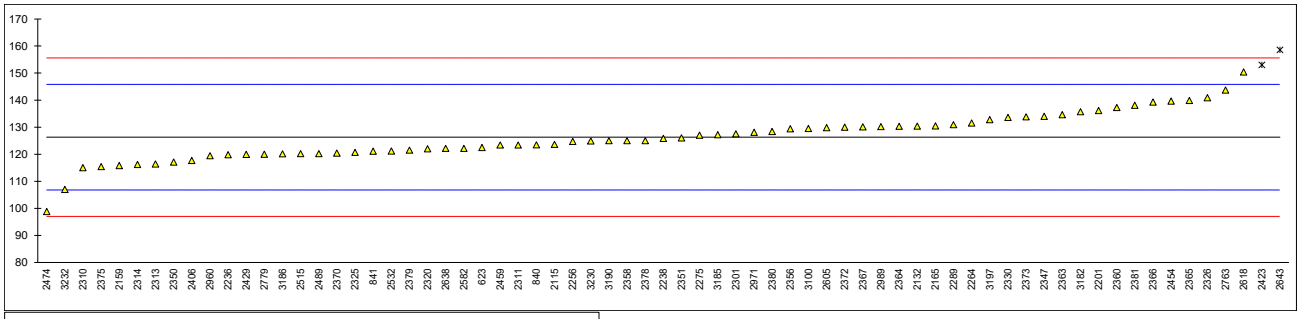


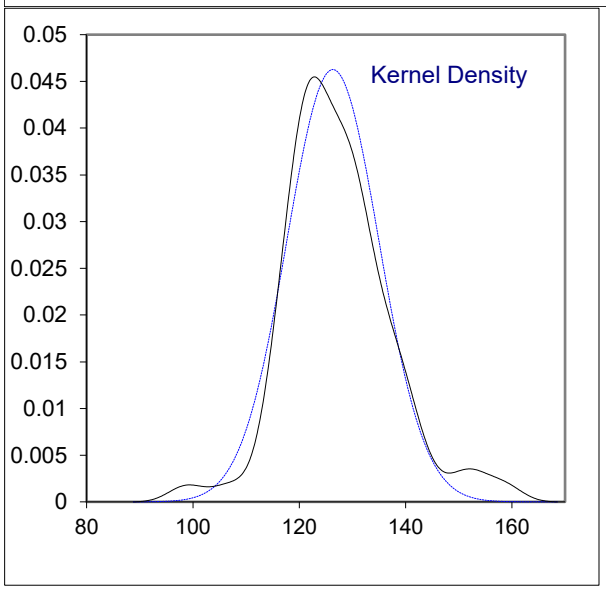
Determination of Released Formaldehyde on sample #22755; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339		-----		-----	
362		-----		-----	
623	ISO14184-2	122.50	C	-0.39	First reported 91.64
840	ISO14184-2	123.45		-0.29	
841	ISO14184-2	121.1		-0.54	
1213		-----		-----	
2102		-----		-----	
2115	ISO14184-2	123.6		-0.28	
2121		-----		-----	
2132	ISO14184-2	130.3940		0.42	
2137		-----		-----	
2138		-----		-----	
2146		-----		-----	
2159	ISO14184-2	115.8		-1.08	
2165	ISO14184-2	130.48		0.43	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2201	ISO14184-2	136.14		1.01	
2226		-----		-----	
2236	AATCC112	119.80		-0.67	
2238	ISO14184-2	125.88		-0.05	
2255		-----		-----	
2256	ISO14184-2	124.73		-0.16	
2264	AATCC112	131.5		0.53	
2265		-----		-----	
2269		-----		-----	
2275	ISO14184-2	127.06		0.08	
2289	ISO14184-2	130.9		0.47	
2290		-----		-----	
2293		-----		-----	
2301	ISO14184-2	127.53		0.12	
2310	ISO14184-2	115		-1.16	
2311	ISO14184-2	123.41		-0.30	
2313	ISO14184-2	116.40		-1.02	
2314	ISO14184-2	116.2		-1.04	
2320	ISO14184-2	121.99		-0.44	
2325	ISO14184-2	120.7		-0.58	
2326	ISO14184-2	140.89		1.49	
2330	ISO14184-2	133.58		0.74	
2347	ISO14184-2	134		0.79	
2350	AATCC112	117.1	C	-0.95	First reported 234.1
2351	ISO14184-2	126		-0.03	
2356	ISO14184-2	129.4		0.32	
2358	ISO14184-2	125		-0.14	
2360	ISO14184-2	137.2		1.12	
2363	ISO14184-2	134.6		0.85	
2364	ISO14184-2	130.3		0.41	
2365	ISO14184-2	139.82		1.38	
2366	ISO14184-2	139.3		1.33	
2367	ISO14184-2	130.08		0.39	
2370	ISO14184-2	120.4		-0.61	
2372	ISO14184-2	130		0.38	
2373	ISO14184-2	133.78		0.76	
2375	ISO14184-2	115.4		-1.12	
2378	GB/T2912	125		-0.14	
2379	ISO14184-2	121.4877		-0.50	
2380	ISO14184-2	128.4		0.21	
2381	ISO14184-2	138.10		1.21	
2382		-----		-----	
2385		-----		-----	
2406	ISO14184-2	117.7		-0.88	
2410		-----		-----	
2423	ISO14184-2	152.98	DG(0.05)	2.73	
2426		-----		-----	
2429	ISO14184-2	119.9		-0.66	
2442		-----		-----	
2453		-----		-----	
2454	ISO14184-2	139.6		1.36	
2456		-----		-----	
2459	ISO14184-2	123.4	C	-0.30	First reported 163.4
2474	ISO14184-2	98.8		-2.82	
2475		-----		-----	

lab	method	value	mark	z(targ)	remarks
2476		-----		-----	
2483		-----		-----	
2489	ISO14184-2	120.22		-0.63	
2492		-----		-----	
2495		-----		-----	
2511		-----		-----	
2514		-----		-----	
2515	ISO14184-2	120.2		-0.63	
2519		-----		-----	
2527		-----		-----	
2532	ISO14184-2	121.2		-0.52	
2534		-----		-----	
2561		-----		-----	
2567		-----		-----	
2572		-----		-----	
2582	ISO14184-2	122.1579		-0.43	
2590		-----		-----	
2591		-----		-----	
2598		-----		-----	
2602		-----	W	-----	Test result withdrawn, reported 76.6
2605	ISO14184-2	129.8		0.36	
2618	ISO14184-2	150.40	C	2.47	First reported 226.72
2629		-----		-----	
2638	ISO14184-2	122.15		-0.43	
2643	ISO14184-2	158.55	DG(0.05)	3.30	
2644		-----		-----	
2674		-----		-----	
2678		-----		-----	
2763	ISO14184-2	143.7		1.78	
2779	ISO14184-2	120		-0.65	
2826		-----		-----	
2858		-----		-----	
2864		-----		-----	
2867		-----		-----	
2908		-----		-----	
2912		-----		-----	
2921		-----		-----	
2926		-----		-----	
2950		-----		-----	
2953		-----		-----	
2955		-----		-----	
2960	ISO14184-2	119.46		-0.70	
2971	ISO14184-2	128.1		0.18	
2976		-----		-----	
2977		-----		-----	
2984		-----		-----	
2989	ISO14184-2	130.2110		0.40	
2991		-----		-----	
3003		-----		-----	
3100	AATCC112	129.5		0.33	
3110		-----		-----	
3116		-----		-----	
3118		-----		-----	
3149		-----		-----	
3153		-----		-----	
3154		-----		-----	
3160		-----		-----	
3166		-----		-----	
3172		-----		-----	
3176		-----		-----	
3182	ISO14184-2	135.7		0.96	
3185	ISO14184-2	127.24		0.09	
3186	ISO14184-2	120.13		-0.63	
3190	ISO14184-2	124.97		-0.14	
3197	ISO14184-2	132.75		0.66	
3198		-----		-----	
3207		-----		-----	
3210		-----		-----	
3214		-----		-----	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
3230	In house	124.85		-0.15	
3232	ISO14184-2	107.00		-1.98	
3237		-----		-----	
3248		-----		-----	
8005		-----		-----	
8008		-----		-----	

normality	suspect	
n	67	
outliers	2	
mean (n)	126.322	
st.dev. (n)	8.6247	RSD = 7%
R(calc.)	24.149	
st.dev.(Horwitz)	9.7565	
R(Horwitz)	27.318	



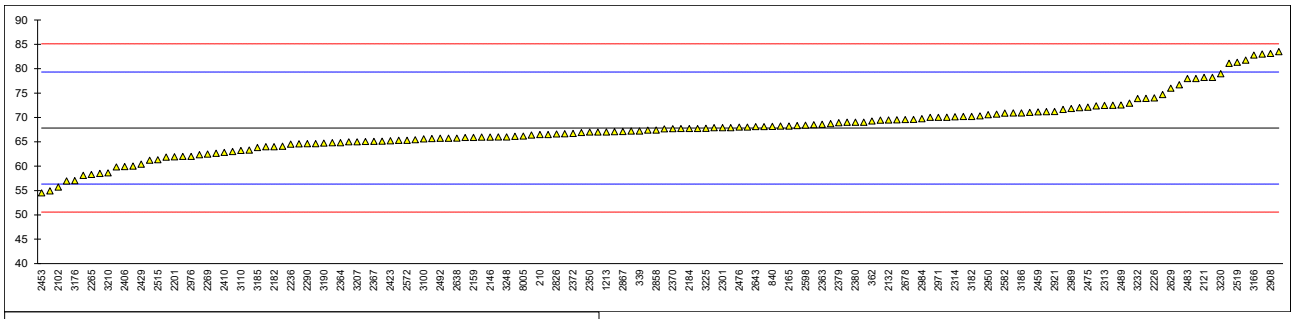


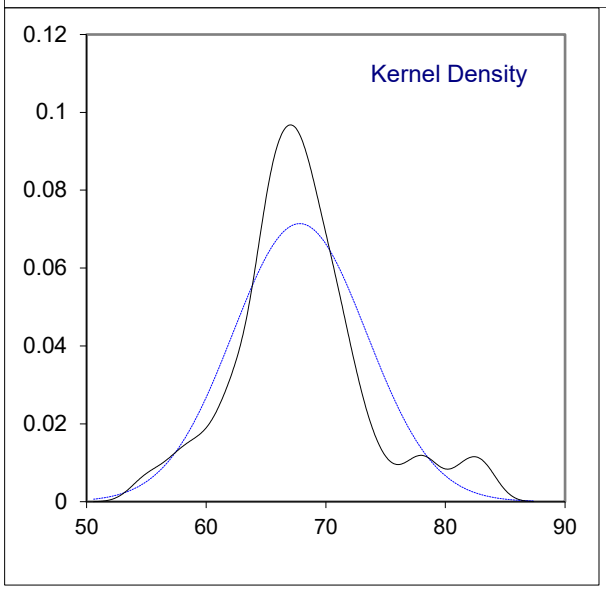
Determination of Free Formaldehyde on sample #22756; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210	ISO14184-1	66.47		-0.23	
339	ISO14184-1	67.21		-0.11	
362	ISO14184-1	69.24		0.25	
623	ISO14184-1	54.94		-2.24	
840	ISO14184-1	68.15		0.06	
841	ISO14184-1	65.1		-0.47	
1213	ISO14184-1	67.01		-0.14	
2102	In house	55.72		-2.10	
2115	ISO14184-1	58.5		-1.62	
2121		78.2		1.80	
2132	ISO14184-1	69.4638		0.29	
2137	ISO14184-1	71.03		0.56	
2138	ISO14184-1	67.88		0.01	
2146	ISO14184-1	65.96		-0.32	
2159	ISO14184-1	65.9		-0.33	
2165	ISO14184-1	68.231		0.07	
2170	ISO14184-1	70.18		0.41	
2182	JST1.6.2	64.0		-0.66	
2184	ISO14184-1	67.7		-0.02	
2201	ISO14184-1	61.90		-1.03	
2226	ISO14184-1	73.99		1.07	
2236	ISO14184-1	64.51		-0.58	
2238	ISO14184-1	64.08		-0.65	
2255	ISO14184-1	69.0		0.21	
2256	ISO14184-1	65.40		-0.42	
2264		-----		-----	
2265	ISO14184-1	58.28		-1.66	
2269	ISO14184-1	62.49		-0.93	
2275	ISO14184-1	64.58		-0.56	
2289	ISO14184-1	65.3		-0.44	
2290	ISO14184-1	64.6		-0.56	
2293	ISO14184-1	81.77		2.43	
2301	ISO14184-1	67.90		0.01	
2310	ISO14184-1	70		0.38	
2311	ISO14184-1	67.698		-0.02	
2313	ISO14184-1	72.46		0.81	
2314	GB/T2912	70.13		0.40	
2320	ISO14184-1	66.48		-0.23	
2325	ISO14184-1	76.7		1.54	
2326	ISO14184-1	72.36		0.79	
2330	GB/T2912	68.71		0.15	
2347	GB/T2912	66		-0.32	
2350	ISO14184-1	66.98		-0.15	
2351	ISO14184-1	63		-0.84	
2356	ISO14184-1	64.0		-0.66	
2358	ISO14184-1	69		0.21	
2360	ISO14184-1	64.8		-0.52	
2363	ISO14184-1	68.6		0.14	
2364	ISO14184-1	64.8		-0.52	
2365	ISO14184-1	68.22		0.07	
2366	ISO14184-1	68.3		0.08	
2367	ISO14184-1	65.08		-0.48	
2370	ISO14184-1	67.69		-0.02	
2372	ISO14184-1	66.7		-0.19	
2373	ISO14184-1	64.99		-0.49	
2375	ISO14184-1	64.6		-0.56	
2378	GB/T2912	62		-1.01	
2379	ISO14184-1	68.9183		0.19	
2380	ISO14184-1	69.0		0.21	
2381	ISO14184-1	68.50		0.12	
2382	ISO14184-1	67.7		-0.02	
2385	ISO14184-1	83		2.64	
2406	ISO14184-1	59.9		-1.38	
2410	ISO14184-1	62.8		-0.87	
2423	ISO14184-1	65.19		-0.46	
2426	ISO14184-1	70.9		0.54	
2429	ISO14184-1	60.4		-1.29	
2442		-----		-----	
2453	ISO14184-1	54.49		-2.32	
2454	ISO14184-1	66.9		-0.16	
2456	ISO14184-1	71.65		0.67	
2459	ISO14184-1	71.13		0.58	
2474	ISO14184-1	58.1		-1.69	
2475	ISO14184-1	72.08		0.74	

lab	method	value	mark	z(targ)	remarks
2476	ISO14184-1	68.0		0.03	
2483	ISO14184-1	78.0		1.77	
2489	ISO14184-1	72.56		0.82	
2492	ISO14184-1/GB/T2912-1	65.71		-0.37	
2495	ISO14184-1	67.654		-0.03	
2511	ISO14184-1	73.9		1.06	
2514	ISO14184-1	70.03		0.38	
2515	ISO14184-1	61.3		-1.13	
2519	ISO14184-1	81.3		2.34	
2527	ISO14184-1	66.64		-0.21	
2532	ISO14184-1	72.5		0.81	
2534	GB/T2912	81.09		2.31	
2561	ISO14184-1	63.3		-0.79	
2567	ISO14184-1	69.5		0.29	
2572	ISO14184-1	65.3		-0.44	
2582	ISO14184-1	70.8724		0.53	
2590	ISO14184-1	65.875		-0.34	
2591	ISO14184-1	69.4436		0.28	
2598	ISO14184-1	68.4		0.10	
2602	ASU B82.02-1	67.2		-0.11	
2605	ISO14184-1	66.1		-0.30	
2618	ISO14184-1	83.480		2.72	
2629	ISO14184-1	76.0		1.42	
2638	ISO14184-1	65.75		-0.36	
2643	ISO14184-1	68.10		0.05	
2644	ISO14184-1	78		1.77	
2674	ISO14184-1	67.9		0.01	
2678	ISO14184-1	69.55		0.30	
2763	ISO14184-1	72.9		0.88	
2779	ISO14184-1	72.0		0.73	
2826	ISO14184-1	66.6		-0.21	
2858	ISO14184-1	67.40		-0.07	
2864	ISO14184-1	70.67		0.50	
2867	ISO14184-1	67.1		-0.13	
2908	ISO14184-1	83.12		2.66	
2912	ISO14184-1	70.3		0.43	
2921	JIS L1041	71.21		0.59	
2926	ISO14184.1	56.95		-1.89	
2950	ISO14184-1	70.55		0.47	
2953	ISO14184-1	78.21		1.81	
2955	ISO14184-1	68.1		0.05	
2960	ISO14184-1	65.05		-0.48	
2971	ISO14184-1	70.0		0.38	
2976	ISO14184-1	62		-1.01	
2977	ISO14184-1	69.58		0.31	
2984	ISO14184-1	69.7471		0.34	
2989	ISO14184-1	71.8101		0.69	
2991	GB/T2910.1	71.2		0.59	
3003	ISO14184-1	68.00		0.03	
3100	JIS L1041	65.6		-0.39	
3110	ISO14184-1	63.2		-0.80	
3116	ISO14184-1	65.67		-0.37	
3118	ISO14184-1	67.38		-0.08	
3149	ISO14184-1	74.7		1.20	
3153	ISO14184-1	66.38		-0.25	
3154	ISO14184-1	61.852		-1.04	
3160	ISO14184-1	59.816		-1.39	
3166	In house	82.8		2.60	
3172	ISO14184-1	62.632		-0.90	
3176	JL112	57.0	C	-1.88	First reported 28.47
3182	ISO14184-1	70.2		0.41	
3185	ISO14184-1	63.80		-0.70	
3186	ISO14184-1	70.9		0.54	
3190	ISO14184-1	64.71		-0.54	
3197	ISO14184-1	65.95		-0.32	
3198	ISO14184-1	62.34		-0.95	
3207	JIS L1041	65		-0.49	
3210	In house	58.61		-1.60	
3214	ISO14184-1	65.72		-0.36	
3218	ISO14184-1	67.08		-0.13	
3225	ISO14184-1	67.78		-0.01	
3228	ISO14184-1	67		-0.14	
3230	In house	78.96		1.94	
3232	ISO14184-1	73.87		1.05	
3237	ISO14184-1	60		-1.36	
3248	GB/T2912	66		-0.32	
8005	JIS L1041	66.17		-0.29	
8008	JTS ST1.6	61.2		-1.15	

normality	suspect	
n	150	
outliers	0	
mean (n)	67.819	
st.dev. (n)	5.5889	RSD = 8%
R(calc.)	15.649	
st.dev.(Horwitz)	5.7521	
R(Horwitz)	16.106	



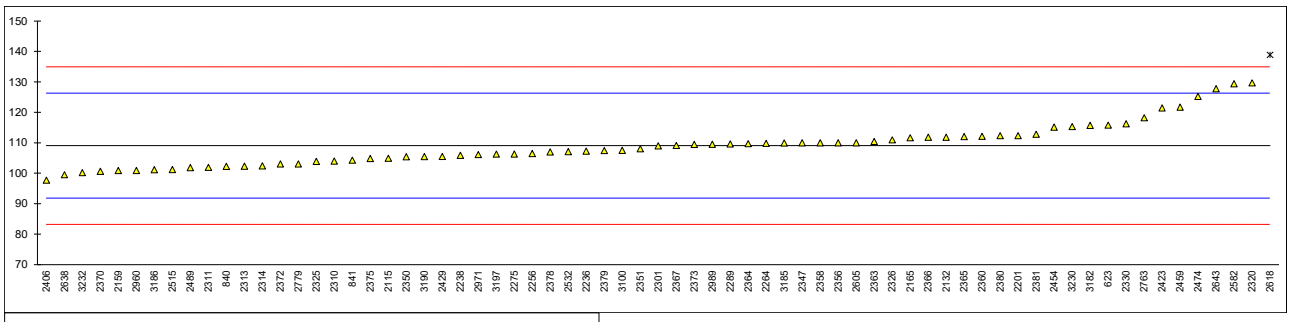


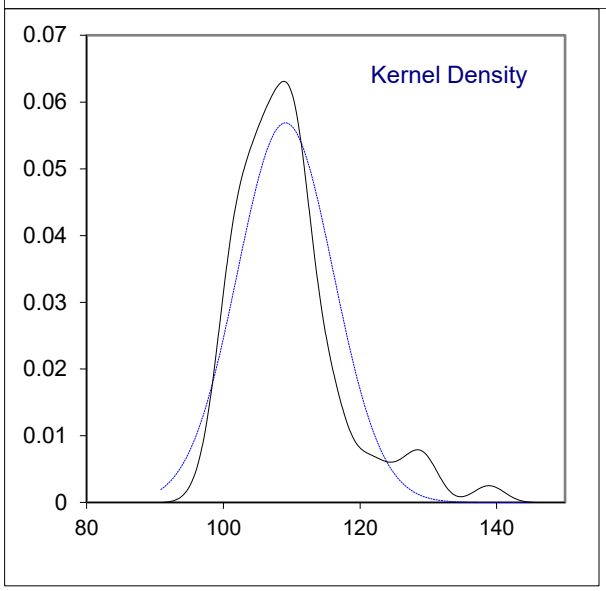
Determination of Released Formaldehyde on sample #22756; results in mg/kg

lab	method	value	mark	z(targ)	remarks
210		-----		-----	
339		-----		-----	
362		-----		-----	
623	ISO14184-2	115.79		0.78	
840	ISO14184-2	102.27		-0.79	
841	ISO14184-2	104.3		-0.56	
1213		-----		-----	
2102		-----		-----	
2115	ISO14184-2	104.9		-0.49	
2121		-----		-----	
2132	ISO14184-2	111.8136		0.32	
2137		-----		-----	
2138		-----		-----	
2146		-----		-----	
2159	ISO14184-2	100.9		-0.95	
2165	ISO14184-2	111.61		0.29	
2170		-----		-----	
2182		-----		-----	
2184		-----		-----	
2201	ISO14184-2	112.31		0.37	
2226		-----		-----	
2236	AATCC112	107.21		-0.22	
2238	ISO14184-2	105.88		-0.37	
2255		-----		-----	
2256	ISO14184-2	106.45		-0.31	
2264	AATCC112	109.8		0.08	
2265		-----		-----	
2269		-----		-----	
2275	ISO14184-2	106.33		-0.32	
2289	ISO14184-2	109.6		0.06	
2290		-----		-----	
2293		-----		-----	
2301	ISO14184-2	108.95		-0.02	
2310	ISO14184-2	104		-0.59	
2311	ISO14184-2	101.91		-0.83	
2313	ISO14184-2	102.30		-0.79	
2314	GB/T2912	102.4		-0.78	
2320	ISO14184-2	129.67		2.39	
2325	ISO14184-2	103.9		-0.60	
2326	ISO14184-2	110.95		0.22	
2330	AATCC112	116.23		0.83	
2347	GB/T2912	110		0.11	
2350	AATCC112	105.4	C	-0.43	First reported 210.87
2351	ISO14184-2	108		-0.13	
2356	ISO14184-2	110.0		0.11	
2358	ISO14184-2	110		0.11	
2360	ISO14184-2	112.1		0.35	
2363	ISO14184-2	110.4		0.15	
2364	ISO14184-2	109.7		0.07	
2365	ISO14184-2	112.01		0.34	
2366	ISO14184-2	111.8		0.31	
2367	ISO14184-2	109.13		0.01	
2370	ISO14184-2	100.6		-0.99	
2372	ISO14184-2	103		-0.71	
2373	ISO14184-2	109.46		0.04	
2375	ISO14184-2	104.8		-0.50	
2378	GB/T2912	107		-0.24	
2379	ISO14184-2	107.4201		-0.19	
2380	ISO14184-2	112.3		0.37	
2381	ISO14184-2	112.80		0.43	
2382		-----		-----	
2385		-----		-----	
2406	ISO14184-2	97.7		-1.32	
2410		-----		-----	
2423	ISO14184-2	121.43		1.43	
2426		-----		-----	
2429	ISO14184-2	105.5		-0.42	
2442		-----		-----	
2453		-----		-----	
2454	ISO14184-2	115.1		0.70	
2456		-----		-----	
2459	ISO14184-2	121.70		1.46	
2474	ISO14184-2	125.2		1.87	
2475		-----		-----	

lab	method	value	mark	z(targ)	remarks
2476		-----		-----	
2483		-----		-----	
2489	ISO14184-2	101.81		-0.84	
2492		-----		-----	
2495		-----		-----	
2511		-----		-----	
2514		-----		-----	
2515	ISO14184-2	101.2		-0.92	
2519		-----		-----	
2527		-----		-----	
2532	ISO14184-2	107.1		-0.23	
2534		-----		-----	
2561		-----		-----	
2567		-----		-----	
2572		-----		-----	
2582	ISO14184-2	129.3855		2.36	
2590		-----		-----	
2591		-----		-----	
2598		-----		-----	
2602		-----	W	-----	Test result withdrawn, reported 67.2
2605	ISO14184-2	110.0		0.11	
2618	ISO14184-2	138.860	R(0.01)	3.46	
2629		-----		-----	
2638	ISO14184-2	99.49		-1.11	
2643	ISO14184-2	127.75		2.17	
2644		-----		-----	
2674		-----		-----	
2678		-----		-----	
2763	ISO14184-2	118.2		1.06	
2779	ISO14184-2	103		-0.71	
2826		-----		-----	
2858		-----		-----	
2864		-----		-----	
2867		-----		-----	
2908		-----		-----	
2912		-----		-----	
2921		-----		-----	
2926		-----		-----	
2950		-----		-----	
2953		-----		-----	
2955		-----		-----	
2960	ISO14184-2	100.91		-0.95	
2971	ISO14184-2	106.1		-0.35	
2976		-----		-----	
2977		-----		-----	
2984		-----		-----	
2989	ISO14184-2	109.5100		0.05	
2991		-----		-----	
3003		-----		-----	
3100	AATCC112	107.5		-0.18	
3110		-----		-----	
3116		-----		-----	
3118		-----		-----	
3149		-----		-----	
3153		-----		-----	
3154		-----		-----	
3160		-----		-----	
3166		-----		-----	
3172		-----		-----	
3176		-----		-----	
3182	ISO14184-2	115.7		0.77	
3185	ISO14184-2	109.92		0.10	
3186	ISO14184-2	101.15		-0.92	
3190	ISO14184-2	105.43		-0.42	
3197	ISO14184-2	106.25		-0.33	
3198		-----		-----	
3207		-----		-----	
3210		-----		-----	
3214		-----		-----	
3218		-----		-----	
3225		-----		-----	
3228		-----		-----	
3230	In house	115.32		0.72	
3232	ISO14184-2	100.16		-1.04	
3237		-----		-----	
3248		-----		-----	
8005		-----		-----	
8008		-----		-----	

normality	not OK	
n	68	
outliers	1	
mean (n)	109.087	
st.dev. (n)	7.0146	RSD = 6%
R(calc.)	19.641	
st.dev.(Horwitz)	8.6135	
R(Horwitz)	24.118	





APPENDIX 2 Analytical details

lab	ISO/IEC 17025 accredited	Sample Intake Free Formaldehyde (grams)	Sample Intake Released Formaldehyde (grams)	Dimedone confirmation test	Dimedone confirmation done because of
210	Yes	Acc. to ISO 14184-1		No	
339	Yes	environ 2g		No	
362	Yes	1.0g		No	
623	Yes	1	1	Yes	
840	Yes	0.5 gram	1 gram	No	
841	Yes	1.0 gams	1.0 gams	No	
1213	Yes	0.5g		No	
2102	Yes	1 gram		No	
2115	Yes	1 g	1 g	Yes	
2121	Yes	2.5g		No	
2132	Yes	1g	1g	Yes	Result is/are greater than reporting limit.
2137	Yes	1		No	
2138	Yes	about 1g		Yes	
2146	Yes	1,5 g		Yes	For confirmation of the yellow color
2159	Yes	1 gram	1 gram	No	
2165	Yes	0.5g	1.0g	Yes	
2170	Yes	1.0 grams		No	
2182	Yes	1gram		Yes	
2184	Yes	1g		No	
2201	Yes	1.00g	1.00g	Yes	To conform absorption is due to formaldehyde
2226	Yes	1 g		No	
2236	Yes	1.00 gm	1.00 gm	Yes	To confirm the result
2238	Yes	1.g	1 g	No	.
2255	Yes	1.0		Yes	
2256	Yes	1 g	1 g	Yes	To check for the presence of interference.
2264	No		1 gram	No	
2265	Yes	2		Yes	dimedon test according to the standard
2269	Yes	1 gram		Yes	To check for the presence of interference.
2275	Yes	1.0000g	1.0000g	Yes	Yes, it is some discoloration.
2289	Yes	1g	1g	No	
2290	Yes			---	
2293	Yes	1		No	
2301	Yes	1.0070	1.0082	No	
2310	Yes	1	1	No	
2311	Yes	1	1	No	
2313	Yes	1.0	1.0	No	
2314	Yes	1.0	0.5	No	
2320	Yes	1.01g	1.01g	No	
2325	Yes	1.0	1.0	No	
2326	Yes	1g	1g	No	
2330	Yes	1 gram	1 gram	Yes	would like to confirmation of formaldehyde
2347	Yes	1g	0.5g	No	
2350	Yes	1g	1g	No	
2351	Yes			---	
2356	Yes	1g	1g	No	
2358	Yes	1.g	1.g	No	
2360	Yes	1.0037g	1.0067g	No	
2363	Yes	1g	1g	No	
2364	Yes	1g	1g	No	
2365	Yes	0.5g	0.5g	No	
2366	Yes	1g	0.5g	No	
2367	Yes	1.0002	1.0002	Yes	
2370	Yes	1 g	1 g	Yes	To check for the presence of interference.
2372	Yes	1g	1g	No	
2373	Yes	1.00g	1.00g	Yes	Confirmation test only for ISO14184-1
2375	Yes	1 gram	1 gram	No	
2378	Yes	1g	1g	No	
2379	Yes	0.5g	1g	Yes	The result of sample is more than LOQ
2380	Yes	1.0 g	1.0 g	No	
2381	Yes	1 gm	1 gm	No	
2382	Yes	1g	/	No	

lab	ISO/IEC 17025 accredited	Sample Intake Free Formaldehyde (grams)	Sample Intake Released Formaldehyde (grams)	Dimedone confirmation test	Dimedone confirmation done because of
2385	Yes	1 g	---	No	
2406	No	1 gram	1 gram	No	
2410	Yes	0.5 g		No	
2423	No	1g	1g	No	
2426	Yes	Appros 1 gram		Yes	
2429	Yes	1g	1g	No	
2442	---			---	
2453	No	±2g		---	
2454	Yes	1.0000g, two paralled tests total:2.0000g	1.0000g,two paralled tests total:2.0000g	Yes	To check for the presence of interference.
2456	Yes	All the dispatched sample was used.	No	Yes	
2459	Yes	1.0 gram	1.0 gram	No	
2474	Yes	1.00 gram	1.00 gram	No	
2475	Yes	0.500		No	
2476	---	1 gram		---	
2483	Yes	1.00		No	
2489	Yes	1 Gram	1 Gram	No	
2492	Yes	0.5g		No	
2495	Yes	1.00		No	
2511	---	1g		---	
2514	Yes	1 g		Yes	
2515	Yes	1gram	1 gram	Yes	
2519	Yes	1		Yes	Because of the colored extract.
2527	Yes	0.5		No	
2532	Yes	1 gram	1 gram	Yes	Free Formaldehyde - further sample cut before analysis. Released Formaldehyde - as such sample received proceeded testing.
2534	Yes	1 gr		No	
2561	Yes	1g		No	
2567	Yes	0.5 gm	0.5 gm	No	
2572	Yes			---	
2582	Yes	1.0 gram	1.0 gram	Yes	for furter confirmation
2590	Yes	1.25g		Yes	
2591	Yes			No	
2598	Yes	1.006		Yes	
2602	Yes	1 g	1 g	No	The method ASU B 82.02-1 was used, this method concerns a total of both (free + released formaldehyde).
2605	Yes	#22755:2g;#22756:2g	#22755:2g;#22756:2g	Yes	
2618	Yes	1 gram	0.5 gram	No	
2629	Yes	1.0 G		No	
2638	No	0.83 gm	0.83 gm	No	
2643	Yes	1 g	1 g	No	
2644	Yes	1g		Yes	yes because we usually perform it
2674	Yes	1g		Yes	
2678	Yes	1 g		No	
2763	Yes	1.00 gm	0.68 gm	Yes	
2779	Yes	1 g	1 g	No	-
2826	Yes	1 gram		Yes	To check for the presence of interference.
2858	Yes	1.0084 gm		Yes	
2864	Yes	1 g		No	
2867	Yes	1g		Yes	
2908	Yes	1		No	
2912	Yes	1,004g		No	
2921	Yes	1 g		No	
2926	Yes	1 g		Yes	To confirm absorbance
2950	Yes	1 gram		No	
2953	Yes	0.5		No	
2955	Yes	1.00 gm		No	
2960	Yes	1g	1g	No	
2971	Yes	1g	1g	Yes	Dimedone confirmation color reaction is formaldehyde
2976	Yes	1.0 gram		Yes	To check for the presence of interference.
2977	Yes	1g		No	Internal method HPLC-DAD sample 22755: 80,79 mg/kg Internal method HPLC-DAD sample 22756: 69,94 mg/kg

lab	ISO/IEC 17025 accredited	Sample Intake Free Formaldehyde (grams)	Sample Intake Released Formaldehyde (grams)	Dimedone confirmation test	Dimedone confirmation done because of
2984	Yes	1g		Yes	
2989	No	1.0041g	1.0049g	No	
2991	Yes	2 gram		No	
3003	Yes	1.001 gm		No	
3100	Yes	1g	1g	No	
3110	---			---	
3116	Yes	1 gram		Yes	The amount of formaldehyde determined in the samples was higher than the laboratory reporting limit.
3118	Yes	0.5 gram		No	
3149	Yes	1-2 g		No	
3153	Yes	1 gram		No	
3154	Yes	0,5		No	
3160	No	1 g		Yes	
3166	Yes	0.5		No	
3172	Yes			---	
3176	Yes	1		No	For #22755 sample, JIS L 1041 method was used. For #22756 sample, Japanese Law 112 method was used.
3182	Yes	1.00 gram	1.00 gram	Yes	1g
3185	Yes	1g	1g	No	
3186	No	1 gm	1 gm	No	
3190	No	1.0000g	1.0000g	No	
3197	Yes	1 g	1 g	No	
3198	Yes	2.5 g		No	
3207	Yes	1 gram		Yes	Sample # 22755 Dimidone = 9 ppm Sample # 22756 Dimidone = 9 ppm
3210	Yes	1		No	
3214	Yes	1 g		No	
3218	Yes	1g		Yes	1g
3225	Yes	0.5		Yes	Confirmation is required for any positive result
3228	Yes	1.0g		No	
3230	Yes	1 GRAM	1 GRAM	No	
3232	Yes	1 g	1 g	No	
3237	Yes	1 gr	-	No	
3248	Yes	1.0000		Yes	the calculated absorbance is greater than the reporting limit.
8005	Yes	1 gram		Yes	The amount of formaldehyde determined in the samples was higher than the laboratory reporting limit.
8008	---			---	

APPENDIX 3

Number of participants per country

10 labs in BANGLADESH
1 lab in BULGARIA
2 labs in CAMBODIA
1 lab in CZECH REPUBLIC
1 lab in EGYPT
1 lab in FINLAND
5 labs in FRANCE
5 labs in GERMANY
1 lab in GUATEMALA
15 labs in HONG KONG
9 labs in INDIA
5 labs in INDONESIA
10 labs in ITALY
6 labs in KOREA, Republic of
1 lab in MAURITIUS
2 labs in MEXICO
2 labs in MOROCCO
31 labs in P.R. of CHINA
7 labs in PAKISTAN
1 lab in PERU
1 lab in PORTUGAL
1 lab in SERBIA
1 lab in SINGAPORE
2 labs in SPAIN
2 labs in SRI LANKA
6 labs in TAIWAN
3 labs in THAILAND
1 lab in THE NETHERLANDS
2 labs in TUNISIA
5 labs in TURKEY
2 labs in U.S.A.
1 lab in UNITED KINGDOM
9 labs in VIETNAM

APPENDIX 4

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?

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
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7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
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12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)