Results of Proficiency Test
Free and Released
Formaldehyde in textile
November 2018

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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 2018/2019, it was decided to continue the proficiency test for the analysis of Free and Released Formaldehyde in textile.

In this interlaboratory study 188 laboratories in 39 different countries registered for participation. See appendix 3 for the number of participating laboratories per country.

In this report, the results of the 2018 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 analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided to send two different positive samples, labelled #18635 and #18636, of approx. resp. 3 and 5 gram each. 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/IEC 17043:2010. 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, each positive on (Free) Formaldehyde were selected. From the first batch, a dark blue colored cotton, 200 subsamples of approx. 3 grams were prepared and labelled #18635. Each sample was packed in a polypropylene bag and wrapped in aluminum foil. The homogeneity of the subsamples was checked on 7 stratified randomly selected samples. See the following tables for the test results.

	Free Formaldehyde in mg/kg
Sample #18635-1	29.9
Sample #18635-2	28.5
Sample #18635-3	27.9
Sample #18635-4	30.0
Sample #18635-5	28.9
Sample #18635-6	29.5
Sample #18635-7	30.0

Table 1: homogeneity test results of subsamples #18635

From the above test results, the repeatability was calculated and compared with 0.3 times the corresponding reproducibility of the target reproducibility of the reference method in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Free Formaldehyde in mg/kg
r(observed)	2.3
reference method	Horwitz
0.3 x R (reference method)	2.4

Table 2: evaluation of the repeatability of subsamples #18635

The calculated repeatability of the subsamples was in agreement with 0.3 times the corresponding reproducibility estimated using the Horwitz equation. Therefore, homogeneity of the subsamples #18635 was assumed.

From the second batch, a yellow colored cotton, 200 subsamples of approx. 5 grams were prepared and labelled #18636. Each sample was packed in a polypropylene bag and wrapped in aluminum foil. The homogeneity of the subsamples was checked on 8 stratified randomly selected samples. See the following tables for the test results.

	Free Formaldehyde in mg/kg
Sample #18636-1	50.2
Sample #18636-2	49.4
Sample #18636-3	49.2
Sample #18636-4	50.5
Sample #18636-5	49.5
Sample #18636-6	49.8
Sample #18636-7	48.5
Sample #18636-8	49.9

Table 3: homogeneity test results of subsamples #18636

From the above test results, the repeatability was calculated and compared with 0.3 times the corresponding reproducibility of the target reproducibility of the reference method in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Free Formaldehyde in mg/kg
r(observed)	1.7
Reference	Horwitz
0.3 x R (reference)	3.7

Table 4: evaluation of the repeatability of subsamples #18636

The calculated repeatability of the subsamples was in agreement with 0.3 times the corresponding reproducibility estimated using the Horwitz equation. Therefore, homogeneity of the subsamples #18636 was assumed.

To each of the participating laboratories 1 sample labelled #18635 containing 3 grams and 1 sample labelled #18636 containing 5 grams was sent on October 10, 2018.

2.5   ANALYSES

The participants were requested to determine on both samples (#18635 and #18636) the Free Formaldehyde content and the Released Formaldehyde content.
It was requested to report if the laboratory was accredited for the requested components that were determined. It was also requested 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 test 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 and 2 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. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. 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:

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

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:

$$|z| < 1 \quad \text{good}$$
$$1 < |z| < 2 \quad \text{satisfactory}$$
$$2 < |z| < 3 \quad \text{questionable}$$
$$3 < |z| \quad \text{unsatisfactory}$$

4   EVALUATION

During the execution of this proficiency test, no problems were encountered with the delivery of the samples. Three laboratories did not report any test results and eight laboratories reported the results after the final reporting date.
Finally, the 185 reporting laboratories sent in total 512 numerical test results. Observed were 11 outlying test results, which is 2.1% of the numerical test results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

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 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 for calibration or performance than the ISO14184 methods. Therefore, it was concluded that reliable reproducibility data cannot be estimated form the ISO14184 methods. Therefore, target reproducibilities estimated from the Horwitz equation were used for statistical evaluation.

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.

Sample #18635:
Free Formaldehyde content: This determination may be problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the estimated reproducibility using the Horwitz equation.

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

Sample #18636:
Free Formaldehyde content: This determination may be problematic. Four statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the estimated reproducibility using the Horwitz equation.

<u>Released Formaldehyde:</u> This determination may be problematic. One statistical outlier
was observed. 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.

Parameter	unit	n	average	2.8 * sd	R (target)
Free Formaldehyde	mg/kg	177	27.5	9.6	7.5
Released Formaldehyde	mg/kg	72	43.3	13.9	11.0

Table 5: reproducibilities of tests on sample #18635

Parameter	unit	n	average	2.8 * sd	R (target)
Free Formaldehyde	mg/kg	177	67.7	25.0	16.1
Released Formaldehyde	mg/kg	75	112.4	34.7	24.7

Table 6: reproducibilities of tests on sample #18636

Without further statistical calculations, the group of participating laboratories have some
difficulties with the analysis of Free and Released Formaldehyde. However, the analysis
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 2018 WITH PREVIOUS PTS

	Nov 2018	Nov 2017	Nov 2016	Nov 2015	Oct 2014
Number of reporting labs	185	184	192	192	176
Number of results reported	512	511	452	415	193
Number of statistical outliers	11	15	26	14	8
Percentage outliers	2.1%	2.9%	5.8%	3.4%	4.1%

Table 7: 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.

	Nov 2018	Nov 2017	Nov 2016	Nov 2015	2009 - 2014
Free Formaldehyde	12-13%	9-10%	8-9%	9-10%	7-15%
Released Formaldehyde	11%	7-8%	9-10%	17-22%	9-10%

Table 8: Comparison of relative uncertainties over the years

The uncertainties, present in the results for the two samples with Free and Released Formaldehyde during the present PT, are fully in line with the uncertainties as observed in previous iis PTs.

4.4 EVALUATION OF ANALYTICAL DETAILS

The reported analytical details that were used by the participants are listed in appendix 2. About 82% of the participating laboratories reported to be accredited for the determination of Free and Released Formaldehyde in textile.

For this PT only 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 in sample #18635 nor in sample #18636.

5 DISCUSSION

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 (Table 9), it was noticed that not all participants would make identical decisions about the acceptability of the textiles for the determined parameters.

Ecolabel	baby clothes	Öko-Tex 103 in direct skin contact	Öko-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 #18635, all of the reporting laboratories would accept the sample for the category: "in direct skin contact" (<75 mg/kg), but would reject it for the category "baby clothes" and "next to skin use" (<16 mg/kg), except for two laboratories.

For sample #18636, 33 of the reporting laboratories would reject for the category: "in direct skin contact" (<75 mg/kg). All reporting laboratories would accept the sample for the category: "no direct skin contact" (<300 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 content 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.

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.
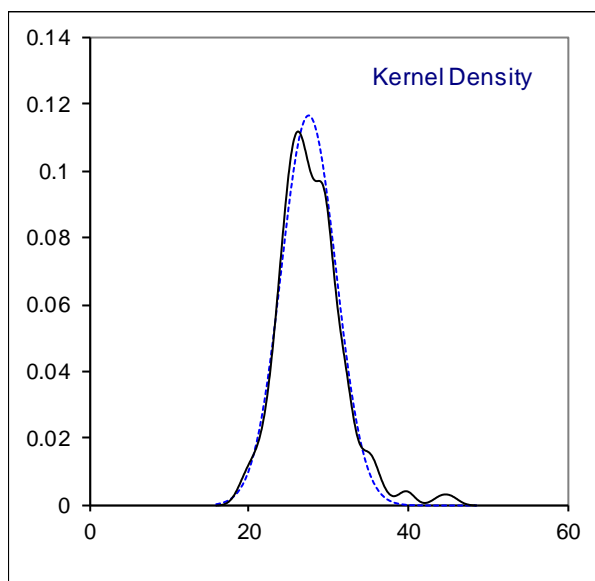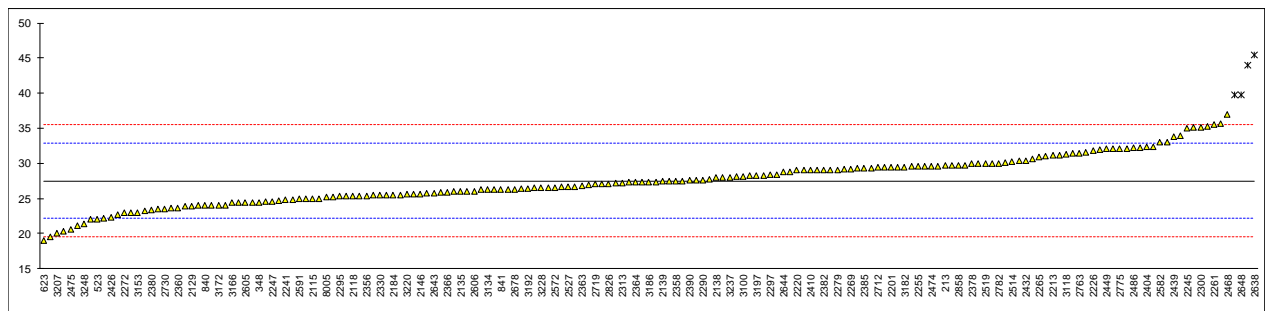
APPENDIX 1
Determination of Free Formaldehyde content on sample #18635; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
110		-----		-----	2375	ISO14184-1	29.1		0.60
213	ISO14184-1	29.7		0.83	2378	GB/T2912	30.0		0.94
230	ISO14184-1	26.3		-0.44	2379	ISO14184-1	23.879		-1.35
339	ISO14184-1	<8	False -	<-7.30	2380	ISO14184-1	23.3		-1.57
348	In house	24.47		-1.13	2381	ISO14184-1	26.48		-0.38
362	ISO14184-1	22.92		-1.71	2382	ISO14184-1	29.06		0.59
523	ISO14184-1	22.07	C	-2.03	2383	ISo14184-1	29.0		0.57
551	ISO14184-1	43.99	C,R(0.01)	6.18	2385	ISO14184-1	29.3		0.68
623	ISO14184-1	19.00		-3.18	2389	ISO14184-1	25.0		-0.93
840	ISO14184-1	24.0		-1.31	2390	ISO14184-1	27.54		0.02
841	ISO14184-1	26.3		-0.44	2401	ISO14184-1	34		2.44
1099	ISO14184-1	23.2		-1.61	2403	ISO14184-1	33.07		2.09
2102	In house	25.72		-0.66	2404	ISO14184-1	32.40		1.84
2115	ISO14184-1	25		-0.93	2410	ISO14184-1	29		0.57
2118	ISO14184-1	25.33		-0.81	2415	ISO14184-1	25.48		-0.75
2129	ISO14184-1	23.9		-1.34	2426	ISO14184-1	22.3		-1.94
2132	ISO14184-1	25.5		-0.74	2429	ISO14184-1	28.1		0.23
2135	ISO14184-1	26.0		-0.56	2432	ISO14184-1	30.34		1.07
2138	ISO14184-1	28		0.19	2433	ISO14184-1	27.38		-0.04
2139	ISO14184-1	27.4		-0.03	2439	ISO14184-1	33.84		2.38
2146	ISO14184-1	25.64505		-0.69	2442	ISO14184-1	27.30		-0.07
2159	ISO14184-1	23.56		-1.47	2446	In house	29.55		0.77
2165	ISO14184-1	26.4		-0.41	2449	ISO14184-1	32.094		1.72
2170	ISO14184-1	31.6		1.54	2452		-----		-----
2184	ISO14184-1	25.5		-0.74	2453	ISO14184-1	26.6		-0.33
2201	ISO14184-1	29.5		0.75	2454	ISO14184-1	31.4		1.46
2212	JIS L1041-B	27.2		-0.11	2456	ISO14184-1	21.15	C	-2.37
2213	GB/T2912	31.1		1.35	2459		-----		-----
2220	JIS L1041L	29.0		0.57	2468	EN14184-1	37		3.56
2225	ISO14184-1	31.01		1.32	2474	ISO14184-1	29.6		0.79
2226	ISO14184-1	31.76		1.60	2475	ISO14184-1	20.61		-2.58
2236	ISO14184-1	26.71		-0.29	2476	ISO14184-1	29.3		0.68
2238	ISO14184-1	24.98		-0.94	2483	ISO14184-1	30.00		0.94
2241	ISO14184-1	24.8		-1.01	2486	ISO14184-1	32.2		1.76
2245	ISO14184-1	35		2.81	2489	ISO14184-1	28		0.19
2247	ISO14184-1	24.6		-1.08	2497	ISO14184-1	35.12		2.86
2255	ISO14184-1	29.6		0.79	2500	ISO14184-1	24.02		-1.30
2256	ISO14184-1	24.4		-1.16	2511	ISO14184-1	24.66		-1.06
2261	GB/T2912	35.5		3.00	2514	ISO14184-1	30.20		1.02
2264	JIS L1041	24.01		-1.30	2519	ISO14184-1	30.0		0.94
2265	ISO14184-1	30.83		1.25	2527	ISO14184-1	26.7		-0.30
2269	ISO14184-1	29.24		0.66	2534	GB/T2912	30		0.94
2272	ISO14184-1	22.9		-1.72	2553	ISO14184-1	32.121		1.73
2275	ISO14184-1	29.6		0.79	2561	ISO14184-1	<16	False -	<-4.30
2277	ISO14184-1	29.4763		0.74	2567	ISO14184-1	29.7		0.83
2279	ISO14184-1	29.10		0.60	2572	ISO14184-1	26.58		-0.34
2280	ISO14184-1	29.3		0.68	2573	ISO14184-1	29.2		0.64
2289	ISO14184-1	31.1		1.35	2582	ISO14184-1	32.98		2.06
2290	ISO14184-1	27.61		0.05	2589	ISO14184-1	27.27		-0.08
2293	ISO14184-1	30.13		0.99	2590	ISO14184-1	26.20		-0.48
2294	JIS L1041	N/D		-----	2591	In house	24.957		-0.95
2295	ISO14184-1	25.3		-0.82	2605	GB/T2912	24.4		-1.16
2297	ISO14184-1	28.32		0.31	2606	ISO14184-1	26.0		-0.56
2298	JIS L1041	28.2		0.27	2609	ISO14184-1	26.9		-0.22
2300	ISO14184-1	35.17	C	2.88	2614	ISO14184-1	35.7		3.07
2301	ISO14184-1	32.40		1.84	2622	ISO14184-1	39.7	R(0.05)	4.57
2310	ISO14184-1	26.54		-0.36	2625	ISO14184-1	24.58		-1.09
2311	ISO14184-1	30.3		1.05	2626	ISO14184-1	25.6		-0.71
2313	ISO14184-1	27.23		-0.10	2629	ISO14184-1	30.64		1.18
2314	ISO14184-1	27.74		0.09	2638	ISO14184-1	45.423	C,R(0.01)	6.71
2330	ISO14184-1	25.47		-0.76	2643	ISO14184-1	25.80		-0.63
2347	ISO14184-1	26		-0.56	2644	ISO14184-1	28.81		0.49
2348	ISO14184-1	22.73		-1.78	2648	GB/T2912	39.81	R(0.05)	4.61
2351	ISO14184-1	24		-1.31	2665	In house	22.14		-2.00
2352	GB/T2912	28.232		0.28	2667	ISO14184-1	32.226		1.77
2356	ISO14184-1	25.4		-0.78	2674	ISO14184-1	26.3		-0.44
2358	ISO14184-1	27.42		-0.03	2678	ISO14184-1	26.3		-0.44
2360	ISO14184-1	23.67		-1.43	2712	ISO14184-1	29.4		0.72
2363	GB/T2912	26.8		-0.26	2719	ISO14184-1	27		-0.18
2364	ISO14184-1	27.3		-0.07	2730	ISO14184-1	23.49		-1.50
2365	ISO14184-1	27.5		0.00	2763	ISO14184-1	31.4		1.46
2366	ISO14184-1	25.9		-0.59	2775	ISO14184-1	32.105		1.73
2367	ISO14184-1	27.08		-0.15	2782	GB/T2912	30		0.94
2370	ISO14184-1	25.26		-0.83	2804	JIS L1041	29.5		0.75
2373	ISO14184-1	28.4		0.34	2826	ISO14184-1	27.09		-0.15
2374		-----		-----	2847	ISO14184-1	27.59		0.04

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
2849	ISO14184-1	35.27		2.91	3185	ISO14184-1	25.3		-0.82
2852	ISO14184-1	32.01		1.69	3186	ISO14184-1	27.3		-0.07
2858	ISO14184-1	29.7		0.83	3190	ISO14184-1	29.6		0.79
2859	GB/T2912	29.73		0.84	3191	GB/T2912	25.3540		-0.80
2863	ISO14184-1	27.40		-0.03	3192	B82.02-1	26.45		-0.39
2865	ISO14184-1	32.10		1.73	3195	ISO14184-1	24.8		-1.01
3100	ISO14184-1	28.1		0.23	3197	ISO14184-1	28.2		0.27
3116	ISO14184-1	28.82		0.50	3207		20.1		-2.77
3118	ISO14184-1	31.26		1.41	3209	ISO14184-1	23.451		-1.51
3134	ISO14184-1	26.2		-0.48	3210	ISO14184-1	25.95		-0.58
3146	ISO14184-1	29.0		0.57	3216	ISO14184-1	20.26		-2.71
3150	ISO14184-1	22.0		-2.05	3220	ISO14184-1	25.54		-0.73
3153	ISO14184-1	23.0		-1.68	3225	ISO14184-1	25.46		-0.76
3154	ISO14184-1	24.40		-1.16	3228	ISO14184-1	26.5		-0.37
3166	In house	24.39		-1.16	3237	ISO14184-1	28		0.19
3172	ISO14184-1	24.01		-1.30	3246	ISO14184-1	25.83		-0.62
3176	ISO14184-1	19.52		-2.98	3248	ISO14184-1	21.37		-2.29
3182	ISO14184-1	29.5		0.75	8005	JIS L1041	25.16		-0.87

normality	OK	
n	177	
outliers	4	
mean (n)	27.488	RSD% = 12%
st.dev. (n)	3.4292	
R(calc.)	9.602	
st.dev.(Horwitz)	2.6709	
R(Horwitz)	7.478	

Lab 523: First reported 16.34
Lab 551: First reported 40.42
Lab 2300: First reported 44.95
Lab 2456: First reported 38.68
Lab 2638: First reported 37.932
Lab 339: False negative test result?
Lab 2561: False negative test result?

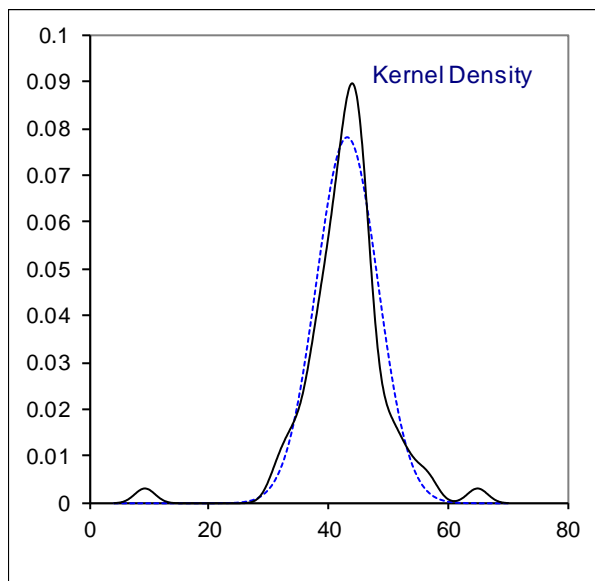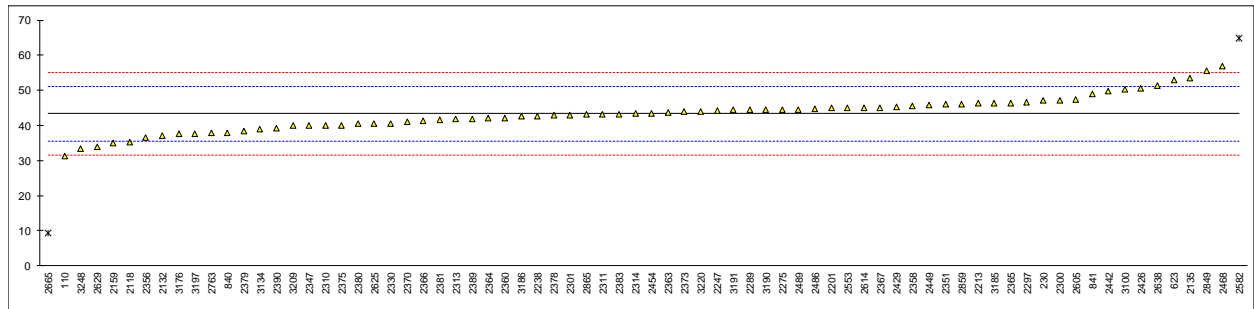Kernel Density

Determination of Released Formaldehyde content on sample #18635; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
110	In house	31.167		-3.09	2375	ISO14184-2	40.1		-0.82
213		-----		-----	2378	GB/T2912	43.0		-0.08
230	ISO14184-2	47.2		0.99	2379	ISO14184-2	38.303		-1.28
339		-----		-----	2380	ISO14184-2	40.4		-0.74
348		-----		-----	2381	ISO14184-2	41.6		-0.44
362		-----		-----	2382		-----		-----
523		-----		-----	2383	ISO14184-2	43.2		-0.03
551		-----		-----	2385		-----		-----
623	ISO14184-2	52.87		2.43	2389	ISO14184-2	41.9		-0.36
840	ISO14184-2	38.0		-1.35	2390	ISO14184-2	39.07		-1.08
841	ISO14184-2	48.9		1.42	2401		-----		-----
1099		-----		-----	2403		-----		-----
2102		-----		-----	2404		-----		-----
2115		-----		-----	2410		-----		-----
2118	ISO14184-2	35.3		-2.04	2415		-----		-----
2129		-----		-----	2426	ISO14184-2	50.5		1.83
2132	ISO14184-2	37.1		-1.58	2429	ISO14184-2	45.2		0.48
2135	ISO14184-2	53.5		2.59	2432		-----		-----
2138		-----		-----	2433		-----		-----
2139		-----		-----	2439		-----		-----
2146		-----		-----	2442	ISO14184-2	49.68		1.62
2159	ISO14184-2	34.88		-2.15	2446		-----		-----
2165		-----		-----	2449	ISO14184-2	45.759		0.62
2170		-----		-----	2452		-----		-----
2184		-----		-----	2453		-----		-----
2201	ISO14184-2	45.0		0.43	2454	ISO14184-2	43.4		0.02
2212		-----		-----	2456		-----		-----
2213	ISO14184-2	46.2		0.73	2459		-----		-----
2220		-----		-----	2468	EN14184-2	57		3.48
2225		-----		-----	2474		-----		-----
2226		-----		-----	2475		-----		-----
2236		-----		-----	2476		-----		-----
2238	ISO14184-2	42.66		-0.17	2483		-----		-----
2241		-----		-----	2486	ISO14184-2	44.8		0.38
2245		-----		-----	2489	ISO14184-2	44.6		0.32
2247	ISO14184-2	44.1		0.20	2497		-----		-----
2255	ISO14184-2	NA		-----	2500		-----		-----
2256		-----		-----	2511		-----		-----
2261		-----		-----	2514		-----		-----
2264		-----		-----	2519		-----		-----
2265		-----		-----	2527		-----		-----
2269		-----		-----	2534		-----		-----
2272		-----		-----	2553	ISO14184-2	45.043		0.44
2275	ISO14184-2	44.6		0.32	2561		-----		-----
2277		-----		-----	2567		-----		-----
2279		-----		-----	2572		-----		-----
2280		-----		-----	2573	ISO14184-2	---		-----
2289	ISO14184-2	44.5		0.30	2582	ISO14184-2	64.9	C,R(0.01)	5.49
2290		-----		-----	2589		-----		-----
2293		-----		-----	2590		-----		-----
2294		-----		-----	2591		-----		-----
2295		-----		-----	2605	ISO14184-2	47.5		1.06
2297	ISO14184-2	46.52		0.81	2606		-----		-----
2298		-----		-----	2609		-----		-----
2300	ISO14184-2	47.25		1.00	2614	ISO14184-2	45.13		0.46
2301	ISO14184-2	43.01		-0.08	2622		-----		-----
2310	ISO14184-2	40.01		-0.84	2625	AATCC112	40.45		-0.73
2311	ISO14184-2	43.1		-0.06	2626		-----		-----
2313	ISO14184-2	41.72		-0.41	2629	ISO14184-2	33.88		-2.40
2314	ISO14184-2	43.33		0.00	2638	ISO14184-2	51.458		2.07
2330	ISO14184-2	40.52		-0.71	2643		-----		-----
2347	ISO14184-2	40		-0.85	2644		-----		-----
2348		-----		-----	2648		-----		-----
2351	ISO14184-2	46		0.68	2665	In house	9.39	R(0.01)	-8.63
2352		-----		-----	2667		-----		-----
2356	ISO14184-2	36.6		-1.71	2674		-----		-----
2358	ISO14184-2	45.46	C	0.54	2678		-----		-----
2360	ISO14184-2	42.18		-0.29	2712		-----		-----
2363	GB/T2912	43.6		0.07	2719		-----		-----
2364	ISO14184-2	42.1		-0.31	2730		-----		-----
2365	ISO14184-2	46.3		0.76	2763	ISO14184-2	37.8		-1.41
2366	ISO14184-2	41.2		-0.54	2775		-----		-----
2367	ISO14184-2	45.14		0.46	2782		-----		-----
2370	ISO14184-2	41.13		-0.56	2804		-----		-----
2373	ISO14184-2	43.9		0.15	2826		-----		-----
2374		-----		-----	2847		-----		-----

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
2849	ISO14184-2	55.66	C	3.14	3185	ISO14184-2	46.2		0.73
2852		-----		-----	3186	ISO14184-2	42.6		-0.18
2858		-----		-----	3190	ISO14184-2	44.5		0.30
2859	GB/T2912	46.10		0.71	3191	GB/T2912	44.4819		0.29
2863		-----		-----	3192		-----		-----
2865	ISO14184-2	43.04		-0.07	3195		-----		-----
3100	ISO14184-2	50.4		1.80	3197	ISO14184-2	37.7		-1.43
3116		-----		-----	3207		-----		-----
3118		-----		-----	3209	ISO14184-2	39.933		-0.86
3134	ISO14184-2	39	C	-1.10	3210		-----		-----
3146		-----		-----	3216		-----		-----
3150		-----		-----	3220	ISO14184-2	43.97		0.16
3153		-----		-----	3225		-----		-----
3154		-----		-----	3228		-----		-----
3166		-----		-----	3237		-----		-----
3172		-----		-----	3246		-----		-----
3176	ISO14184-2	37.50		-1.48	3248	ISO14184-2	33.38		-2.53
3182		-----		-----	8005		-----		-----

normality	OK	
n	72	
outliers	2	
mean (n)	43.323	RSD% = 11%
st.dev. (n)	4.9509	
R(calc.)	13.862	
st.dev.(Horwitz)	3.9309	
R(Horwitz)	11.006	

Lab 2358: First reported 68.66
Lab 2582: First reported 65.7
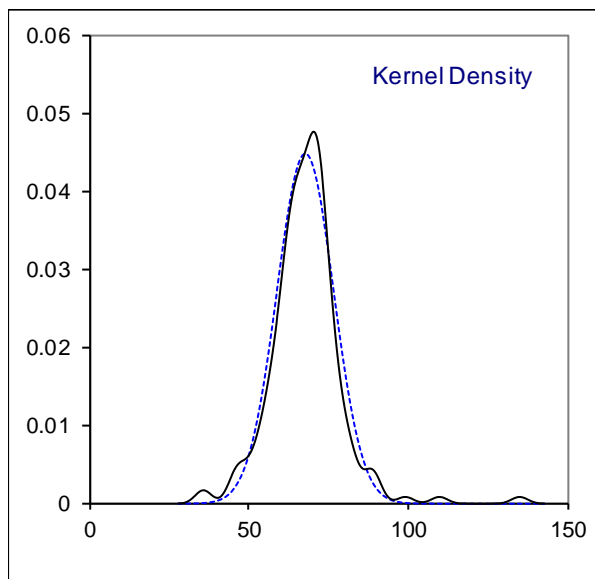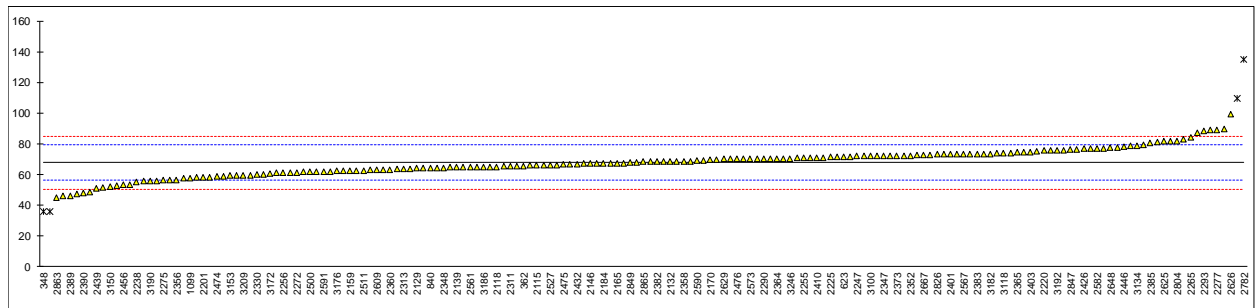Lab 2849: First reported 26.42
Lab 3134: First reported 63.5

Kernel Density

Determination of Free Formaldehyde content on sample #18636; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
110		-----		-----	2375	ISO14184-1	65.1		-0.46
213	ISO14184-1	70.2		0.43	2378	ISO14184-1	72.0		0.74
230	ISO14184-1	62.9		-0.84	2379	ISO14184-1	55.887		-2.06
339	ISO14184-1	53		-2.56	2380	ISO14184-1	62.3		-0.94
348	In house	35.55	R(0.05)	-5.60	2381	ISO14184-1	62.23		-0.96
362	ISO14184-1	65.57		-0.38	2382	ISO14184-1	68.3		0.10
523	ISO14184-1	56.12	C	-2.02	2383	ISO14184-1	73.2		0.95
551	ISO14184-1	89.16		3.73	2385	ISO14184-1	80.8		2.28
623	ISO14184-1	71.40		0.64	2389	ISO14184-1	46.2		-3.75
840	ISO14184-1	64.1		-0.63	2390	ISO14184-1	48.02	C	-3.43
841	ISO14184-1	68.5		0.13	2401	ISO14184-1	73		0.92
1099	ISO14184-1	57.5		-1.78	2403	ISO14184-1	74.71		1.22
2102	In house	63.61		-0.72	2404	ISO14184-1	71.30		0.62
2115	ISO14184-1	66		-0.30	2410	ISO14184-1	71		0.57
2118	ISO14184-1	65.04		-0.47	2415	ISO14184-1	64.75		-0.52
2129	ISO14184-1	64.0		-0.65	2426	ISO14184-1	76.6		1.54
2132	ISO14184-1	68.5		0.13	2429	ISO14184-1	55.5		-2.13
2135	ISO14184-1	72.8		0.88	2432	ISO14184-1	66.91		-0.14
2138	ISO14184-1	65		-0.47	2433	ISO14184-1	76.35		1.50
2139	ISO14184-1	64.8		-0.51	2439	ISO14184-1	50.98		-2.91
2146	ISO14184-1	67.0738		-0.11	2442	ISO14184-1	74.65		1.21
2159	ISO14184-1	62.28		-0.95	2446	In house	78.06	C	1.80
2165	ISO14184-1	67.5		-0.04	2449	ISO14184-1	73.693		1.04
2170	ISO14184-1	69.4		0.29	2452		-----		-----
2184	ISO14184-1	67.4		-0.06	2453	ISO14184-1	64.8		-0.51
2201	ISO14184-1	58.3		-1.64	2454	ISO14184-1	59.6		-1.41
2212	JIS L1041-B	70.6	C	0.50	2456	ISO14184-1	53.49	C	-2.48
2213	GB/T2912	66.02		-0.30	2459		-----		-----
2220	JIS L1041L	75.4		1.34	2468	EN14184-1	81		2.31
2225	ISO14184-1	71.21		0.61	2474	ISO14184-1	58.5		-1.61
2226	ISO14184-1	76.67		1.56	2475	ISO14184-1	66.5		-0.21
2236	ISO14184-1	57.43		-1.79	2476	ISO14184-1	70.2		0.43
2238	ISO14184-1	55.16		-2.19	2483	ISO14184-1	61.00		-1.17
2241	ISO14184-1	63.4		-0.75	2486	ISO14184-1	71.8		0.71
2245	ISO14184-1	73		0.92	2489	ISO14184-1	70.7		0.52
2247	ISO14184-1	71.8		0.71	2497	ISO14184-1	79.15		1.99
2255	ISO14184-1	70.7		0.52	2500	ISO14184-1	61.69		-1.05
2256	ISO14184-1	61.06		-1.16	2511	GB/T2912	62.64		-0.89
2261	GB/T2912	87.3		3.41	2514	ISO14184-1	70.20		0.43
2264	GB/T2912	35.94	R(0.05)	-5.53	2519	ISO14184-1	70.3		0.45
2265	ISO14184-1	84.34	C	2.89	2527	ISO14184-1	66.2		-0.27
2269	ISO14184-1	67.01		-0.12	2534	ISO14184-1	73		0.92
2272	ISO14184-1	61.3		-1.12	2553	ISO14184-1	47.041		-3.60
2275	ISO14184-1	56.1		-2.02	2561	ISO14184-1	64.8		-0.51
2277	ISO14184-1	89.1964		3.74	2567	ISO14184-1	73.05		0.93
2279	ISO14184-1	67.49		-0.04	2572	ISO14184-1	69.83		0.37
2280	ISO14184-1	70.3		0.45	2573	ISO14184-1	70.2		0.43
2289	ISO14184-1	51.5		-2.82	2582	ISO14184-1	76.89		1.60
2290	ISO14184-1	70.29		0.45	2589	ISO14184-1	65.44		-0.40
2293	ISO14184-1	88.51		3.62	2590	ISO14184-1	68.87		0.20
2294	JIS L1041	N/D		-----	2591	In house	61.760		-1.04
2295		-----		-----	2605	GB/T2912	59.4		-1.45
2297	ISO14184-1	73.26		0.96	2606	ISO14184-1	82.9		2.64
2298	JIS L1041	72.1		0.76	2609	ISO14184-1	62.8		-0.86
2300	ISO14184-1	78.7		1.91	2614	ISO14184-1	64.8		-0.51
2301	ISO14184-1	72.56		0.84	2622	ISO14184-1	109.8	R(0.01)	7.32
2310	ISO14184-1	62.01		-0.99	2625	ISO14184-1	81.46		2.39
2311	ISO14184-1	65.4		-0.40	2626	ISO14184-1	99.1		5.46
2313	ISO14184-1	63.41		-0.75	2629	ISO14184-1	70.1		0.41
2314	ISO14184-1	58.94		-1.53	2638	ISO14184-1	45.757	C	-3.82
2330	ISO14184-1	59.95		-1.35	2643		-----		-----
2347	GB/T2912	72		0.74	2644	ISO14184-1	75.34	C	1.33
2348	ISO14184-1	64.14		-0.62	2648	GB/T2912	77.61		1.72
2351	ISO14184-1	69		0.22	2665	In house	81.64		2.42
2352	GB/T2912	72.151		0.77	2667	ISO14184-1	72.640		0.86
2356	ISO14184-1	56.3		-1.99	2674	ISO14184-1	68.2		0.08
2358	ISO14184-1	68.66	C	0.16	2678	ISO14184-1	57.9		-1.71
2360	ISO14184-1	62.90		-0.84	2712	ISO14184-1	67.3		-0.07
2363	GB/T2912	64.1		-0.63	2719	ISO14184-1	68		0.05
2364	ISO14184-1	70.3		0.45	2730	ISO14184-1	61.71		-1.05
2365	ISO14184-1	74.3		1.14	2763	ISO14184-1	89.7		3.82
2366	ISO14184-1	65.9		-0.32	2775	ISO14184-1	76.95		1.61
2367	ISO14184-1	71.08		0.58	2782	GB/T2912	135	C,R(0.01)	11.71
2370	GB/T2912	61.51		-1.08	2804	JIS L1041	81.8		2.45
2373	ISO14184-1	72.1		0.76	2826	ISO14184-1	72.97		0.91
2374		-----		-----	2847	ISO14184-1	76.31		1.49

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
2849	ISO14184-1	67.97		0.04	3185	ISO14184-1	61.1		-1.15
2852	ISO14184-1	75.9	C	1.42	3186	ISO14184-1	64.8		-0.51
2858	ISO14184-1	75.5		1.35	3190	ISO14184-1	55.8		-2.08
2859	GB/T2912	72.10		0.76	3191	ISO14184-1	68.7160		0.17
2863	ISO14184-1	44.74		-4.00	3192	B82.02-1	75.58		1.37
2865	ISO14184-1	68.14		0.07	3195	ISO14184-1	74.1		1.11
3100	ISO14184-1	71.8		0.71	3197	ISO14184-1	71.7		0.69
3116	ISO14184-1	68.42		0.12	3207		53.5		-2.48
3118	ISO14184-1	73.96		1.09	3209	ISO14184-1	59.402		-1.45
3134	ISO14184-1	79	C	1.96	3210	ISO14184-1	66.55		-0.20
3146	ISO14184-1	77.7		1.74	3216	ISO14184-1	48.66		-3.32
3150	ISO14184-1	52.3		-2.68	3220	ISO14184-1	73.14		0.94
3153	ISO14184-1	59.2		-1.48	3225	ISO14184-1	66.24		-0.26
3154	ISO14184-1	62.70		-0.87	3228	ISO14184-1	67.5		-0.04
3166	In house	60.22		-1.31	3237	ISO14184-1	64		-0.65
3172	ISO14184-1	60.8		-1.21	3246	ISO14184-1	70.5		0.48
3176	ISO14184-1	62.10		-0.98	3248	ISO14184-1	58.39		-1.62
3182	ISO14184-1	73.5		1.01	8005	JIS L1041	70.28		0.44

normality	OK	
n	177	
outliers	4	
mean (n)	67.725	RSD% = 13%
st.dev. (n)	8.9197	
R(calc.)	24.975	
st.dev.(Horwitz)	5.7453	
R(Horwitz)	16.087	

Lab 523: First reported 32.80
Lab 2212: First reported 93.1
Lab 2265: First reported 91.97
Lab 2358: First reported 45.46
Lab 2390; First reported 38.22
Lab 2446: First reported 116.83
Lab 2456: First reported 93.76
Lab 2638: First reported 41.653
Lab 2644: First reported 94.17
Lab 2782: First reported 119
Lab 2852: First reported 26.4
Lab 3134: First reported 103.2

Kernel Density

Determination of Released Formaldehyde content on sample #18636; results in mg/kg

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
110	In house	77.227		-3.98	2375	ISO14184-2	105.1		-0.83
213		-----		-----	2378	ISO14184-2	103.1		-1.05
230	ISO14184-2	119.9		0.85	2379	ISO14184-2	106.988		-0.61
339		-----		-----	2380	ISO14184-2	110.2		-0.25
348		-----		-----	2381	ISO14184-2	117.57		0.59
362		-----		-----	2382		-----		-----
523		-----		-----	2383	ISO14184-2	110.1		-0.26
551		-----		-----	2385		-----		-----
623	ISO14184-2	114.90		0.28	2389	ISO14184-2	127.0		1.65
840	ISO14184-2	116.8		0.50	2390	ISO14184-2	119.92		0.85
841	ISO14184-2	99.3		-1.48	2401		-----		-----
1099		-----		-----	2403		-----		-----
2102		-----		-----	2404		-----		-----
2115		-----		-----	2410		-----		-----
2118	ISO14184-2	138.95		3.00	2415		-----		-----
2129		-----		-----	2426	ISO14184-2	141.3		3.27
2132	ISO14184-2	105.2		-0.81	2429	ISO14184-2	110.6		-0.20
2135	ISO14184-2	146.7		3.88	2432		-----		-----
2138		-----		-----	2433		-----		-----
2139		-----		-----	2439		-----		-----
2146		-----		-----	2442	ISO14184-2	120.04		0.86
2159	ISO14184-2	108.46		-0.45	2446		-----		-----
2165		-----		-----	2449	ISO14184-2	109.781		-0.30
2170		-----		-----	2452		-----		-----
2184		-----		-----	2453		-----		-----
2201	ISO14184-2	110.0		-0.27	2454	ISO14184-2	108.6		-0.43
2212		-----		-----	2456		-----		-----
2213	ISO14184-2	100.2	C	-1.38	2459		-----		-----
2220		-----		-----	2468	EN14184-2	147		3.92
2225		-----		-----	2474		-----		-----
2226		-----		-----	2475		-----		-----
2236		-----		-----	2476		-----		-----
2238	ISO14184-2	114.75		0.27	2483		-----		-----
2241		-----		-----	2486	ISO14184-2	111.3		-0.12
2245		-----		-----	2489	ISO14184-2	113.8		0.16
2247	ISO14184-2	114.7		0.26	2497		-----		-----
2255		-----		-----	2500		-----		-----
2256		-----		-----	2511		-----		-----
2261		-----		-----	2514		-----		-----
2264		-----		-----	2519		-----		-----
2265		-----		-----	2527		-----		-----
2269		-----		-----	2534		-----		-----
2272		-----		-----	2553	ISO14184-2	117.993		0.63
2275	ISO14184-2	108.6		-0.43	2561		-----		-----
2277		-----		-----	2567		-----		-----
2279		-----		-----	2572		-----		-----
2280		-----		-----	2573	ISO14184-2	---		-----
2289	ISO14184-2	104.5		-0.89	2582	ISO14184-2	141.0	C	3.24
2290		-----		-----	2589		-----		-----
2293		-----		-----	2590		-----		-----
2294		-----		-----	2591		-----		-----
2295	ISO14184-2	112		-0.05	2605	ISO14184-2	110.2		-0.25
2297	ISO14184-2	117.8		0.61	2606		-----		-----
2298		-----		-----	2609		-----		-----
2300	ISO14184-2	122.15		1.10	2614	ISO14184-2	112.3		-0.01
2301	ISO14184-2	105.44		-0.79	2622		-----		-----
2310	ISO14184-2	100.19		-1.38	2625	AATCC112	105.98		-0.73
2311	ISO14184-2	100.3		-1.37	2626		-----		-----
2313	ISO14184-2	102.8		-1.09	2629	ISO14184-2	90.425		-2.49
2314	ISO14184-2	101.09		-1.28	2638	ISO14184-2	126.630	C	1.61
2330	ISO14184-2	106.64		-0.65	2643	ISO14184-2	119.45		0.80
2347	GB/T2912	100		-1.40	2644		-----		-----
2348		-----		-----	2648		-----		-----
2351	ISO14184-2	112		-0.05	2665	In house	15.33	R(0.01)	-10.99
2352		-----		-----	2667		-----		-----
2356	ISO14184-2	93.6		-2.13	2674		-----		-----
2358	ISO14184-2	108.10		-0.49	2678		-----		-----
2360	ISO14184-2	112.11		-0.03	2712		-----		-----
2363	GB/T2912	109.8		-0.29	2719		-----		-----
2364	ISO14184-2	105.2		-0.81	2730		-----		-----
2365	ISO14184-2	118.0		0.63	2763	ISO14184-2	120.3		0.89
2366	ISO14184-2	101.4		-1.25	2775		-----		-----
2367	ISO14184-2	109.90		-0.28	2782		-----		-----
2370	ISO14184-2	101.3		-1.26	2804		-----		-----
2373	ISO14184-2	111.7		-0.08	2826		-----		-----
2374		-----		-----	2847		-----		-----

lab	method	value	mark	z(targ)	lab	method	value	mark	z(targ)
2849	ISO14184-2	133.34	C	2.37	3185	ISO14184-2	113.1		0.08
2852		-----		-----	3186	ISO14184-2	110.0		-0.27
2858		-----		-----	3190	ISO14184-2	110.4		-0.23
2859	GB/T2912	120.40		0.91	3191	ISO14184-2	118.0384		0.64
2863		-----		-----	3192		-----		-----
2865	ISO14184-2	125.09		1.44	3195		-----		-----
3100	ISO14184-2	110.2		-0.25	3197	ISO14184-2	125.1		1.44
3116		-----		-----	3207		-----		-----
3118		-----		-----	3209	ISO14184-2	105.423		-0.79
3134	ISO14184-2	118.6		0.70	3210		-----		-----
3146		-----		-----	3216		-----		-----
3150		-----		-----	3220	ISO14184-2	110.40		-0.23
3153		-----		-----	3225		-----		-----
3154		-----		-----	3228		-----		-----
3166		-----		-----	3237		-----		-----
3172		-----		-----	3246		-----		-----
3176	ISO14184-2	108.50		-0.44	3248	ISO14184-2	83.06		-3.32
3182		-----		-----	8005		-----		-----

normality	suspect
n	75
outliers	1
mean (n)	112.400	RSD% = 11%
st.dev. (n)	12.4096
R(calc.)	34.747
st.dev.(Horwitz)	8.8352
R(Horwitz)	24.739

Lab 2213: First reported 138.1
Lab 2582: First reported 147.54
Lab 2638: First reported 141.059
Lab 2849: First reported 51.18

Kernel Density
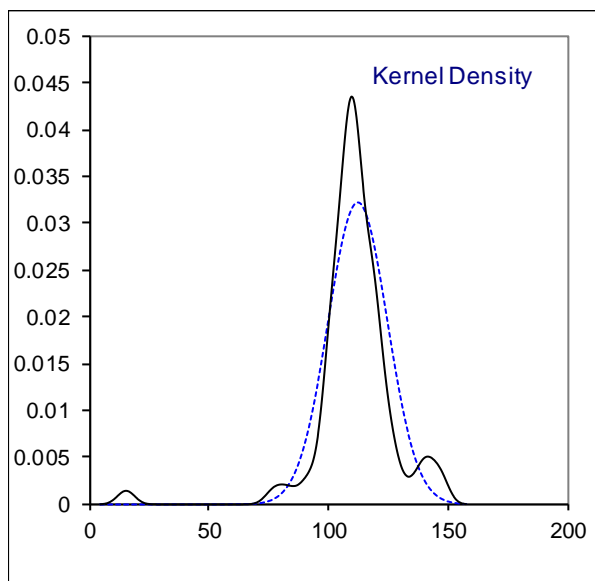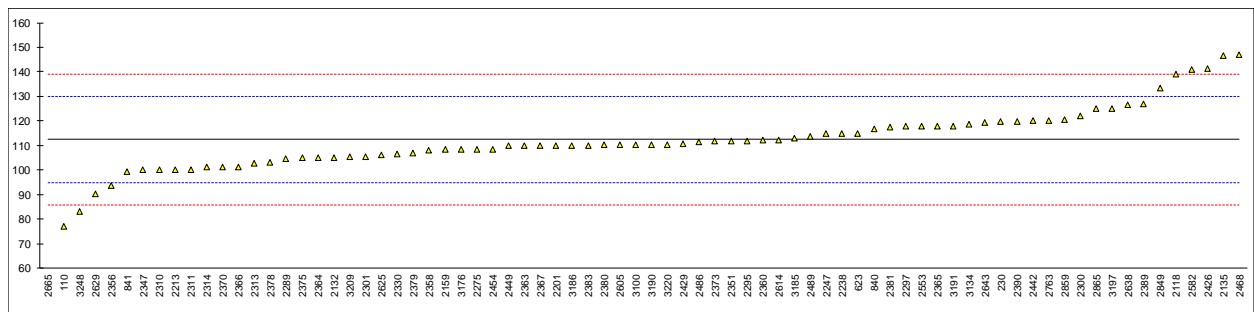
APPENDIX 2
Accreditation status and sample intake as reported by participants

lab	ISO/IEC17025 accredited:	Sample Intake Free Formaldehyde determination (grams):	Sample Intake Released Formaldehyde determination (grams):	Remarks
110	Yes	1	Not prepared	
213	---			
230	Yes	1g	1g	
339	No	3.1g	4.9g	
348	Yes	1		
362	Yes	1.0046		
523	No	1		
551	Yes	1.0		
623	---			
840	Yes	0.5g	1.0g	
841	Yes	0.56g	1g	
1099	Yes	1g		
2102	Yes	1 gram		
2115	Yes	1 g		
2118	Yes	1.25 g/50ml	1 g/50 ml	the sample amount not sufficient
2129	Yes			
2132	Yes	1g	1g	
2135	Yes	1	1	
2138	Yes	1.001 g / 1.003 g	None	
2139	Yes			
2146	Yes	1,50		
2159	Yes	1	1	Dimedone was performed
2165	Yes	1g		
2170	Yes	1.001	NA	
2184	Yes	1g		
2201	Yes	1.00g	1.00g	
2212	Yes	1 gram		
2213	Yes	1 gram	1 gram	
2220	Yes	2.5024		
2225	Yes			
2226	Yes	1.0 g		
2236	Yes	1.0 gram		
2238	Yes	1g	1g	
2241	Yes	2.5		
2245	Yes	1g		
2247	Yes	0.6474	0.6539	
2255	Yes	1.0 gm	NA	
2256	Yes	1 gram	2 gram	
2261	Yes	1.00 grams		
2264	---			
2265	Yes	1		
2269	Yes	1 grams		
2272	Yes	1g		
2275	Yes	0.8000g.	0.8000g.	
2277	Yes	2.5		
2279	Yes	1.0		
2280	Yes	0.5 g	1 g	
2289	Yes	1.0000g	1.0000g	
2290	---			
2293	Yes	2.50 g		
2294	Yes	1 g	N/A	N/A
2295	Yes	1 g	1 g	
2297	Yes	1	1	
2298	Yes			
2300	Yes	1 gram	1 gram	
2301	Yes	1	1	
2310	Yes	1gram	1gram	
2311	Yes	1	1	
2313	Yes	1.0gram	1.0gram	
2314	Yes	1g	1g	
2330	Yes	0.50 grams	0.50 grams	
2347	Yes	0.5g	0.5g	
2348	Yes	1.0g	1.0g	
2351	Yes	1g	2g	
2352	Yes	1g		
2356	Yes	1.0000	1.0000	
2358	Yes	4	2	
2360	Yes	1.0g	1.0g	
2363	Yes	0.5g	0.5g	

lab	ISO/IEC17025 accredited:	Sample Intake Free Formaldehyde determination (grams):	Sample Intake Released Formaldehyde determination (grams):	Remarks
2364	Yes	1.000g	1.000g	
2365	Yes	0.5g	0.5g	
2366	Yes	0.5	0.5	
2367	Yes	0.5g	0.5g	
2370	Yes	1 g	1 g	
2373	Yes	0.5	0.5	
2374	---			
2375	Yes	0,5 gr	0,5 gr	
2378	Yes	1g	1g	
2379	Yes	0.5 g	0.5 g	
2380	Yes	1.00 g	1.00 g	
2381	Yes	1	1	
2382	No	1g		released formaldehyde out cap
2383	Yes	0.5	0.5	
2385	Yes	1 g		
2389	Yes	1 gram	1 gram	
2390	Yes	1.0004, 1.0029	1.0080, 1.0049	
2401	Yes	1g		
2403	Yes	About 2.5 grams		
2404	Yes	2g		
2410	Yes	1 g		
2415	Yes	0.5		
2426	---			
2429	Yes	1g	1g	
2432	No	1		
2433	Yes	1.0 gram	-	
2439	Yes	1		
2442	Yes	1g	1g	
2446	Yes	1		
2449	Yes	1	1	
2452	---			
2453	Yes	1.5		
2454	Yes	1.0000g	1.0000g	
2456	Yes	3		
2459	---			
2468	---			
2474	Yes	1.00	NA	
2475	Yes			
2476	Yes	1 gram		
2483	Yes	0.5 g	1.00 g	
2486	Yes	1 gram	1 gram	
2489	Yes	1 g & 1 g	1 g & 1 g	
2497	Yes	1		
2500	Yes	1.0		
2511	Yes	2	0	
2514	Yes	0.9303 grams		
2519	No	1 g		
2527	Yes	1.0		
2534	Yes	1 gr		
2553	Yes	1g	1g	
2561	---			
2567	Yes	>0.5g; <1.0047g		
2572	---			
2573	Yes	1g		
2582	Yes	1.0g	1.0g	
2589	Yes	0.4957/0.5051		
2590	Yes	1.25		
2591	Yes	1.00		
2605	Yes	1.00g	2.00g	
2606	Yes	1 gram		
2609	Yes	3.0		
2614	Yes	1 gram	1 gram	
2622	No	1		
2625	Yes			
2626	Yes	1.000		
2629	Yes	~ 1.0 g		
2638	No	1 gm	1 gm	
2643	Yes	#18635 : 2g (1g ,1g)	#18636 : 2g(1g, 1g)	
2644	Yes	1		
2648	Yes			
2665	Yes	0,5	0,5	

lab	ISO/IEC17025 accredited:	Sample Intake Free Formaldehyde determination (grams):	Sample Intake Released Formaldehyde determination (grams):	Remarks
2667	---			
2674	Yes	1g		
2678	---			
2712	Yes	3 grams		
2719	---			
2730	No	1		
2763	Yes	1.0015	1.0000	
2775	Yes	0.9678	0.9678	Intake based on humidity correction.
2782	Yes	1.00g		
2804	Yes	1		
2826	No	1 g		
2847	Yes	1 g		
2849	Yes	Average weight around 0.7 g	Average weight around 1 g	
2852	Yes	3 grams	5 grams	
2858	Yes	1.0000 gm		
2859	Yes	0.7 – 1.0 gram	0.8 – 1.0 gram	
2863	No	about 1 g		
2865	Yes	0.5052	1.0047	
3100	Yes	1g	1g	
3116	Yes	1g		
3118	Yes	0.5 gram		
3134	No	0.5g	1g	
3146	Yes	3 gram	5 gram	
3150	Yes	1		
3153	Yes	1 g	NA	
3154	Yes			
3166	Yes	0.5	NA	
3172	Yes			
3176	Yes	0,5	0,5	
3182	Yes	1		
3185	Yes	1g	1g	
3186	Yes	1 gm	1 gm	
3190	Yes	1g	1g	
3191	Yes	0.5 - 1.0 g	0.5 - 1.0 g	
3192	No	1 g		
3195	Yes	approx 3g	/	
3197	Yes	1 gram	1 gram	
3207	Yes	1 gram.		
3209	Yes	1	1	
3210	Yes	2		
3216	---			
3220	Yes	1.0 grams	1.0grams	
3225	Yes	0.5g	Nil	
3228	Yes	1.0g		
3237	Yes	1 g		
3246	Yes	1.00		
3248	Yes	0.5 grams	1.00 grams	
8005	Yes	1 gram		

APPENDIX 3

Number of participants per country

10 labs in BANGLADESH

1 lab in BELGIUM

1 lab in BRAZIL

1 lab in BULGARIA

2 labs in CAMBODIA

1 lab in EGYPT

1 lab in FINLAND

4 labs in FRANCE

10 labs in GERMANY

1 lab in GREECE

1 lab in GUATEMALA

12 labs in HONG KONG

11 labs in INDIA

4 labs in INDONESIA

9 labs in ITALY

5 labs in KOREA

1 lab in MAURITIUS

4 labs in MEXICO

2 labs in MOROCCO

1 lab in NETHERLANDS

53 labs in P.R. of CHINA

7 labs in PAKISTAN

1 lab in PERU

1 lab in PHILIPPINES

3 labs in POLAND

1 lab in PORTUGAL

1 lab in ROMANIA

1 lab in SINGAPORE

1 lab in SLOVENIA

3 labs in SPAIN

2 labs in SRI LANKA

3 labs in TAIWAN R.O.C.

3 labs in THAILAND

3 labs in TUNISIA

6 labs in TURKEY

5 labs in U.S.A.

1 lab in UNITED ARAB EMIRATES

2 labs in UNITED KINGDOM

9 labs in VIETNAM

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

Literature:

1. iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2. Öko-Tex Standard 100; January 2017.
3. Impacts of Environmental Standards and requirements in EU Countries. Aug 99.
4. Horwitz. Journal of AOAC International Vol. 79 No.3. 1996.
5. P.L. Davies. Fr. Z. Anal. Chem. 351. 513 (1988).
6. W.J. Conover. Practical; Nonparametric Statistics. J. Wiley&Sons. NY. p.302 (1971).
7. ISO 5725:86.
8. ISO 5725. parts 1-6:94.
9. ISO105 E4:94.
10. ISO14184-1:94.
11. ISO13528:05.
12. M. Thompson and R. Wood. J. AOAC Int. 76. 926. (1993).
13. Analytical Methods Committee Technical brief, No.4 January 2001.
14. P.J. Lowthian and M. Thompson, The Royal Society of Chemistry 2002, Analyst 2002, 127, 1359-1364
15. Official Journal of the European Communities L133/29: May 2002.
16. Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)