

**Results of Proficiency Test  
Free and Released  
Formaldehyde in textile  
November 2016**

**Organised by:** Institute for Interlaboratory Studies  
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**Author:** ing. C.M. Nijssen-Wester  
**Correctors:** dr. R. Visser & ing. R.J. Starink  
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## 1 INTRODUCTION

Since the 1990's, many countries have adopted environmental standards and requirements restricting the use of harmful chemicals in the production of textiles and clothing. Laws and regulations impose some of these standards and requirements. In addition to mandatory environmental standards and requirements for textiles, there are some Ecolabelling schemes imposing environmental requirements for textile products on a voluntary basis. Well known programs are for instance Milieukeur (the Netherlands), Öko-Tex Standard 100 (Germany), Thai Green Label (Thailand) and Bluesign® (Switzerland), which has created a Bluesign® system substances list (BSSL). Since 2008, the Institute for Interlaboratory Studies (iis) organises a proficiency test (PT) for Free Formaldehyde in textile, which was extended in 2013/2014 with a PT for Released Formaldehyde. During the annual proficiency testing program 2016/2017, it was decided to continue the PT for the analysis of Free and Released Formaldehyde. In this interlaboratory study 194 laboratories in 41 different countries registered for participation. See appendix 3 for the number of participating laboratories per country. In this report, the results of the 2016 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](http://www.iisnl.com).

## 2 SET UP

The Institute for Interlaboratory Studies in Spijkensisse was the organiser of this proficiency test (PT). Sample preparation and analyses of fit-for-use and homogeneity were subcontracted to an ISO17025 accredited laboratory. It was decided to send in this Proficiency Test two positive samples. Sample #16330 is approx. 3 grams and sample #16331 is approx. 1.7 grams. The participants were requested to report rounded and unrounded test results. These unrounded test results were preferably used for the statistical evaluations.

### 2.1 QUALITY SYSTEM

The Institute for Interlaboratory Studies in Spijkensisse, 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 organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of April 2014 (iis-protocol, version 3.3). This protocol can be downloaded from the iis website [www.iisnl.com](http://www.iisnl.com), from the FAQ page.

## 2.3 CONFIDENTIALITY STATEMENT

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

## 2.4 SAMPLES

Two batches, each positive on (Free) Formaldehyde were selected. From the first batch, a pink coloured cotton, 200 subsamples of approx. 3 gram were prepared and labelled #16330. Each sample was packed in aluminium foil.

The homogeneity of the subsamples was checked on 7 stratified randomly selected samples. The homogeneity testing was performed by an accredited laboratory. See the following tables for the test results.

|                 | Free Formaldehyde in mg/kg |
|-----------------|----------------------------|
| Sample #16330-1 | 99.5                       |
| Sample #16330-2 | 95.3                       |
| Sample #16330-3 | 98.1                       |
| Sample #16330-4 | 102.0                      |
| Sample #16330-5 | 99.8                       |
| Sample #16330-6 | 102.0                      |
| Sample #16330-7 | 98.3                       |

Table 1: homogeneity test results of subsamples #16330

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

|                     | Free Formaldehyde in mg/kg |
|---------------------|----------------------------|
| r(observed)         | 6.6                        |
| reference           | Horwitz                    |
| 0.3 x R (reference) | 6.7                        |

Table 2: evaluation of the repeatability of subsamples #16330

From the second batch, a black coloured cotton, 200 subsamples of approx. 1.7 gram were prepared and labelled #16331. Each sample was packed in aluminium foil. The homogeneity of the subsamples was checked on 15 stratified randomly selected samples. The homogeneity testing was performed by a subcontracted ISO17025 accredited laboratory. See the following tables for the test results.

|                  | Free Formaldehyde in mg/kg |
|------------------|----------------------------|
| Sample #16331-1  | 213.1                      |
| Sample #16331-2  | 208.4                      |
| Sample #16331-3  | 212.4                      |
| Sample #16331-4  | 207.6                      |
| Sample #16331-5  | 208.9                      |
| Sample #16331-6  | 206.4                      |
| Sample #16331-7  | 210.1                      |
| Sample #16331-8  | 204.2                      |
| Sample #16331-9  | 211.4                      |
| Sample #16331-10 | 210.1                      |
| Sample #16331-11 | 209.7                      |
| Sample #16331-12 | 211.2                      |
| Sample #16331-13 | 208.4                      |
| Sample #16331-14 | 205.4                      |
| Sample #16331-15 | 209.4                      |

Table 3: homogeneity test results of subsamples #16331

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

|                     | Free Formaldehyde in mg/kg |
|---------------------|----------------------------|
| r(observed)         | 7.0                        |
| reference           | Horwitz                    |
| 0.3 x R (reference) | 12.6                       |

Table 4: evaluation of the repeatability of subsamples #16331

The calculated repeatabilities of subsamples #16330 and #16331 are in good agreement with the target, estimated from the Horwitz equation. Therefore, homogeneity of the subsamples #16330 and #16331 was assumed.

To the participants, a set of samples (1 sample labelled #16330 and 1 sample labelled #16331) was sent on October 12, 2016.

## 2.5 ANALYSIS

The participants were asked to determine on both samples (#16330 and #16331) the Free Formaldehyde content and the Released Formaldehyde content with the analytical procedures that are routinely used in the laboratory.

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 more, but report as much significant figures as possible. It was also requested not to report 'less than' results, which are above the detection limit, because such results cannot be used for meaningful statistical calculations.

To get comparable results a detailed report form, on which the units were prescribed as well as the reference test methods and a letter of instructions were prepared and made available on the data entry portal [www.kmpd.co.uk/sgs-iis-cts/](http://www.kmpd.co.uk/sgs-iis-cts/). The laboratories were also requested to confirm the sample receipt on the same data entry portal together with some details of the test methods used. A letter of instructions was added to the sample package.

### 3 RESULTS

During five weeks after sample dispatch, the results of the individual laboratories were gathered via the data entry portal [www.kmpd.co.uk/sgs-iis-cts/](http://www.kmpd.co.uk/sgs-iis-cts/). The reported test results are tabulated per determination in the appendix 1 of this report. The laboratories are represented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that did not report 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. Additional or corrected test results are used for the data analysis and the original 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 organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies, Protocol for the Organisation, Statistics and Evaluation' of April 2014 (iis-protocol, version 3.3).

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. Not all data sets proved to have a normal distribution, in which cases the statistical evaluation of the results should be used with due care.

In accordance to ISO 5725 the original test results per determination were submitted subsequently 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. 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. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation, it is mentioned in the report and it will have significant consequences for the evaluation of the test results.

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

### 3.2 GRAPHICS

In order to visualise the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported analysis results are plotted. The corresponding laboratory numbers are 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 standard. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. The Kernel Density Graph is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also a normal Gauss curve was projected over the Kernel Density Graph for reference.

### 3.3 Z-SCORES

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

The target standard deviation was calculated from the target reproducibility (preferably taken from a standardized test method) by division with 2.8. In case no literature reproducibility was available, other target values were used.

The z-scores were calculated according to:

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

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

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 should be done in order to evaluate whether the reported test results are fit-for-purpose.

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

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

## 4 EVALUATION

During the execution of this proficiency test, no problems occurred with the delivery of the samples. Two laboratories did not report any test results and five laboratories reported results after the final reporting date.

Finally, the 192 reporting laboratories sent in total 452 numerical test results. Observed were 26 outlying test results, which is 5.8% of the numerical test results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

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 and therefore target reproducibilities estimated from the Horwitz equation were used for evaluation.

One laboratory (2449) reported to have used ISO14184-1 for both Free and Released Formaldehyde. The test results of this laboratory for Released Formaldehyde were excluded from the statistical evaluations.

### 4.1 EVALUATION ANALYSIS DETAILS

For this PT some analysis details were requested (see appendix 2). Questions like: was the laboratory accredited, how long before use was the Acetylacetone prepared and for the Released Formaldehyde only: what was the intake amount of the sample and what was the volume of the water in the jar and at which temperature and how long took the development of the colour?

Looking at the answers given by the participants the following can be summarized:

About 90% of the participants are accredited according to ISO/IEC 17025.



Surprisingly 11% of the participants used the acetylacetone directly after preparation or on the same day instead of after 12 hours as is stated in method ISO14184-1. The other participants used it from 12 hours up to six weeks after preparation.

Roughly half of the participants that reported the volume of water used, used an intake of 50 ml water per gram of sample and the other half used 100 ml water per gram of sample. When evaluating these two above differences in the execution of the test, no relation was found between these test conditions and the reported test results.

However, the temperature, which was used to develop the colour, did appear to have an influence on the test result. From the 158 participants that reported this temperature, 6 participants reported to have used 58-65°C instead of 40°C to develop the colour. The test results of these six laboratories (2228, 2536, 2629, 2700, 3220, 3238) were excluded from the statistical evaluation.

## 4.2 EVALUATION PER SAMPLE

In this section, the reported results are discussed per test and per sample. All statistical results reported on the textile samples are summarised in appendix 1.

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

### **Sample #16330:**

Free Formaldehyde content: This determination may be problematic for a number of laboratories. Nine statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the estimated reproducibility calculated using the Horwitz equation.

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

### **Sample #16331:**

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

Released Formaldehyde: This determination may be problematic. Four statistical outliers were observed and six test results were excluded from the statistical evaluation. The calculated reproducibility after rejection of the suspect data is not in agreement with the estimated reproducibility calculated using the Horwitz equation.

### 4.3 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the calculated reproducibilities using the Horwitz equation and the reproducibilities as found for the group of participating laboratories. The number of significant results, the average results, the calculated reproducibilities (standard deviation\*2.8) and the target reproducibilities (Horwitz equation), are compared in the next table.

| Parameter             | unit  | n   | average | 2.8 * sd | R (target) |
|-----------------------|-------|-----|---------|----------|------------|
| Free Formaldehyde     | mg/kg | 178 | 93.4    | 20.2     | 21.1       |
| Released Formaldehyde | mg/kg | 33  | 147.2   | 42.2     | 31.1       |

Table 5: reproducibilities of tests on sample #16330

| Parameter             | unit  | n   | average | 2.8 * sd | R (target) |
|-----------------------|-------|-----|---------|----------|------------|
| Free Formaldehyde     | mg/kg | 180 | 318.6   | 76.4     | 60.2       |
| Released Formaldehyde | mg/kg | 27  | 915     | 234      | 147        |

Table 6: reproducibilities of tests on sample #16331

From the above tables it can be concluded that, without further statistical calculations, the group of participating laboratories do not have much difficulties with the analysis of Free Formaldehyde. However, the analysis of Released Formaldehyde gives more difficulties when the calculated target results are compared with the Horwitz equation. See also the discussions in paragraphs 4.1 and 6.

### 4.4 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2016 WITH PREVIOUS PTs

|                                | November 2016 | November 2015 | October 2014 | October 2013 | October 2012 |
|--------------------------------|---------------|---------------|--------------|--------------|--------------|
| Number of reporting labs       | 192           | 192           | 176          | 173          | 169          |
| Number of results reported     | 452           | 415           | 193          | 378          | 338          |
| Number of statistical outliers | 26            | 14            | 8            | 13           | 12           |
| Percentage outliers            | 5.8%          | 3.4%          | 4.1%         | 3.4%         | 3.6%         |

Table 7: Comparison with previous PTs

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 (see below table).

| Parameter             | November 2016 | November 2015 | October 2014 | October 2013 | October 2009 - 2012 |
|-----------------------|---------------|---------------|--------------|--------------|---------------------|
| Free Formaldehyde     | 8-9%          | 9-10%         | 8%           | 10-13%       | 7-15%               |
| Released Formaldehyde | 9-10%         | 17-22%        | 10%          | 9-10%        | n.e.                |

Table 8: Comparison of relative uncertainties over the years

## 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<br>in direct skin contact | Öko-Tex 103<br>no direct skin contact |
|---|------------------|---------------------------------------|---------------------------------------|
| Bluesign® BSSL                                | next to skin use | occasional skin contact               | no skin contact                       |
| Free Formaldehyde<br>extractable (mg/kg)      | <16              | 75                                    | 300                                   |
| Released Formaldehyde<br>(mg/m <sup>3</sup> ) | 0.1              | 0.1                                   | 0.1                                   |

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

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.

### Extractable free formaldehyde:

For sample #16330, all reporting laboratories, except one, would accept the sample for the category “no (direct) skin contact” (<300 mg/kg). Only four laboratories would accept the sample for the category “(occasional) skin contact” (<75 mg/kg). All reporting laboratories, would reject the sample for the categories “Baby clothes” and “next to skin use” (<16 mg/kg).

For sample #16331, about 50% of the laboratories would reject and the other 50% of the laboratories would accept the sample for the category “no (direct) skin contact” (<300 mg/kg), since the mean of the formaldehyde for this sample is close to 300 mg/kg. All reporting laboratories would reject the sample for the categories “Baby clothes” and “next to skin use” (<16 mg/kg) and all laboratories, except one, for the category “(occasional) skin contact” (<75 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<sup>3</sup> vs mg/kg).

In this proficiency test, the Free Formaldehyde content and the Released Formaldehyde were determined. The variations observed for the Free Formaldehyde content and the Released Formaldehyde in this interlaboratory study are in line with observations in the previous proficiency tests. The variations observed in this interlaboratory study can be caused by the preparation or the conditioning of the sample and/or by the performance of the analysis. Consequently, the reproducibility cannot be improved by only one change in the analysis. Each laboratory has to 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 #16630; results in mg/kg**

| lab  | method              | value   | mark      | z(targ) | lab  | method     | value    | mark    | z(targ) |
|------|---------------------|---------|-----------|---------|------|------------|----------|---------|---------|
| 213  | ISO14184-1          | 84.6    |           | -1.16   | 2379 | ISO14184-1 | 89.028   |         | -0.57   |
| 230  |                     | 80.25   |           | -1.74   | 2380 | ISO14184-1 | 94.73    |         | 0.18    |
| 348  | In house            | 94.894  |           | 0.20    | 2381 | ISO14184-1 | 90.33    |         | -0.40   |
| 362  | ISO14184-1          | 97.31   |           | 0.52    | 2383 | ISO14184-1 | 77.4     |         | -2.11   |
| 551  | ISO14184-1          | 92.78   |           | -0.08   | 2385 | ISO14184-1 | 92       |         | -0.18   |
| 622  | ISO14184-1          | 88.95   |           | -0.58   | 2389 | ISO14184-1 | 91.4     |         | -0.26   |
| 623  | ISO14184-1          | 105.9   |           | 1.66    | 2390 | ISO14184-1 | 90.3     |         | -0.40   |
| 840  | ISO14184-1          | 85.4    |           | -1.05   | 2401 | GB/T2912   | 92       |         | -0.18   |
| 1132 | In house            | 104.284 |           | 1.45    | 2403 | ISO14184-1 | 93.4     |         | 0.01    |
| 2102 | In house            | 43.76   | R(0.01)   | -6.57   | 2404 | ISO14184-1 | 92.02    |         | -0.18   |
| 2115 | ISO14184-1          | 104.7   |           | 1.50    | 2423 | ISO14184-1 | 85.53    |         | -1.04   |
| 2129 | ISO14184-1          | 83.7    |           | -1.28   | 2426 | ISO14184-1 | 95.1     |         | 0.23    |
| 2132 | ISO14184-1          | 91.10   |           | -0.30   | 2429 | ISO14184-1 | 81.22    |         | -1.61   |
| 2135 | ISO14184-1          | 79.8    | C         | -1.80   | 2432 | ISO14184-1 | 87.27    |         | -0.81   |
| 2138 | ISO14184-1          | 88.995  |           | -0.58   | 2433 | ISO14184-1 | 97.80    |         | 0.59    |
| 2139 | ISO14184-1          | 91.00   | C         | -0.31   | 2439 | ISO14184-1 | 95.566   |         | 0.29    |
| 2146 | ISO14184-1          | 98.11   |           | 0.63    | 2442 | ISO14184-1 | 95.72    |         | 0.31    |
| 2159 | In house            | 93.18   |           | -0.02   | 2446 |            | 104.84   |         | 1.52    |
| 2165 | ISO14184-1          | 95.80   |           | 0.32    | 2449 | ISO14184-1 | 104.053  |         | 1.42    |
| 2170 | ISO14184-1          | 98.018  |           | 0.62    | 2453 | ISO14184-1 | 78.0     |         | -2.03   |
| 2172 | ISO14184-1          | 101     |           | 1.01    | 2454 | ISO14184-1 | 86.07    |         | -0.97   |
| 2182 | Japan Std 2016      | 88.08   |           | -0.70   | 2456 | ISO14184-1 | 87.40    |         | -0.79   |
| 2184 | ISO14184-1          | 94.2    |           | 0.11    | 2462 | ISO14184-1 | 94.4     |         | 0.14    |
| 2190 | ISO14184-1          | 100.2   |           | 0.91    | 2467 | ISO14184-1 | 130.07   | R(0.01) | 4.87    |
| 2201 | ISO14184-1          | 92.64   |           | -0.09   | 2468 | ISO14184-1 | 78.1     |         | -2.02   |
| 2212 | JIS L1041           | 92.0    |           | -0.18   | 2474 | ISO14184-1 | 83.00    |         | -1.37   |
| 2213 | ISO14184-1          | 90.7    |           | -0.35   | 2475 | ISO14184-1 | 89.782   |         | -0.47   |
| 2215 | ISO14184-1          | 94.22   |           | 0.11    | 2476 | ISO14184-1 | 95.0     |         | 0.22    |
| 2216 | JISL1041/ISO14184-1 | 90.03   |           | -0.44   | 2481 | ISO14184-1 | 94.2     |         | 0.11    |
| 2225 | ISO14184-1          | 93.38   |           | 0.00    | 2483 | ISO14184-1 | 94       |         | 0.09    |
| 2226 | ISO14184-1          | 104.835 |           | 1.52    | 2489 | ISO14184-1 | 104.6    |         | 1.49    |
| 2228 | ISO14184-1          | 93.1580 |           | -0.03   | 2495 | ISO14184-1 | 91.57    |         | -0.24   |
| 2236 | ISO14184-1          | 95.28   |           | 0.26    | 2497 | ISO14184-1 | 101.4    | C       | 1.07    |
| 2238 |                     | ----    |           | ----    | 2506 |            | ----     |         | ----    |
| 2241 | ISO14184-1          | 65      | C,R(0.05) | -3.76   | 2511 | ISO14184-1 | 91.6     |         | -0.23   |
| 2245 | ISO14184-1          | 92.0    |           | -0.18   | 2514 | ISO14184-1 | 97.009   |         | 0.48    |
| 2246 | ISO14184-1          | 92.35   |           | -0.13   | 2517 | ISO14184-1 | 97.135   |         | 0.50    |
| 2247 | ISO14184-1          | 101.5   |           | 1.08    | 2519 | ISO14184-1 | 96.5     |         | 0.42    |
| 2254 | ISO14184-1          | 157.204 | R(0.01)   | 8.46    | 2520 |            | ----     |         | ----    |
| 2255 | ISO14184-1          | 91.81   |           | -0.20   | 2527 | ISO14184-1 | 106      |         | 1.68    |
| 2256 | ISO14184-1          | 77.68   |           | -2.08   | 2532 | ISO14184-1 | 97.0     |         | 0.48    |
| 2269 | ISO14184-1          | 392.311 | R(0.01)   | 39.62   | 2534 | ISO14184-1 | 100.68   |         | 0.97    |
| 2275 | ISO14184-1          | 87.40   |           | -0.79   | 2536 | ISO14184-1 | 105.2397 |         | 1.57    |
| 2277 | ISO14184-1          | 85.33   |           | -1.06   | 2546 | ISO14184-1 | 102.1390 |         | 1.16    |
| 2279 | ISO14184-1          | 96      |           | 0.35    | 2553 | ISO14184-1 | 80.142   |         | -1.75   |
| 2280 | ISO14184-1          | 96.48   |           | 0.41    | 2561 | ISO14184-1 | 101.6    |         | 1.09    |
| 2282 | ISO14184-1          | 94.46   |           | 0.15    | 2563 | ISO14184-1 | 91.8     |         | -0.21   |
| 2289 | GB/T2912            | 90.80   |           | -0.34   | 2567 | ISO14184-1 | 94.56    |         | 0.16    |
| 2290 | ISO14184-1          | 90.2    |           | -0.42   | 2569 | ISO14184-1 | 103      |         | 1.28    |
| 2293 | ISO14184-1          | 105.247 |           | 1.58    | 2572 | ISO14184-1 | 89.23    |         | -0.55   |
| 2294 | JIS L1041           | 96.11   |           | 0.37    | 2582 | ISO14184-1 | 67.66    | R(0.05) | -3.41   |
| 2295 | ISO14184-1          | 79.7    |           | -1.81   | 2589 | ISO14184-1 | 99.87    |         | 0.86    |
| 2296 |                     | ----    |           | ----    | 2590 | ISO14184-1 | 95.02    |         | 0.22    |
| 2298 | JIS L1041           | 114.6   |           | 2.82    | 2591 | In house   | 109.23   |         | 2.10    |
| 2301 |                     | ----    |           | ----    | 2596 | GB/T2912   | 111.7    |         | 2.43    |
| 2303 | ISO14184-1          | 86.61   |           | -0.89   | 2598 | ISO14184-1 | 81.685   |         | -1.55   |
| 2310 | ISO14184-1          | 87.03   |           | -0.84   | 2606 | ISO14184-1 | 94.4     |         | 0.14    |
| 2311 | ISO14184-1          | 91.56   |           | -0.24   | 2612 | ISO14184-1 | 96.71    |         | 0.44    |
| 2313 | ISO14184-1          | 89.95   |           | -0.45   | 2614 | ISO14184-1 | 102.2    |         | 1.17    |
| 2314 | ISO14184-1          | 94.2    |           | 0.11    | 2615 | ISO14184-1 | 89.88    |         | -0.46   |
| 2330 | ISO14184-1          | 96.60   |           | 0.43    | 2625 | ISO14184-1 | 92.91    |         | -0.06   |
| 2347 | ISO14184-1          | 96.97   |           | 0.48    | 2629 | ISO14184-1 | 91.946   |         | -0.19   |
| 2348 | ISO14184-1          | 99.15   |           | 0.77    | 2638 | ISO14184-1 | 87.67    |         | -0.75   |
| 2351 | ISO14184-1          | 96      |           | 0.35    | 2644 | ISO14184-1 | 99.11    |         | 0.76    |
| 2356 | ISO14184-1          | 86.5    |           | -0.91   | 2646 | ISO14184-1 | 89       |         | -0.58   |
| 2358 | ISO14184-1          | 93.4    |           | 0.01    | 2667 | ISO14184-1 | 90.21    |         | -0.42   |
| 2360 | ISO14184-1          | 94.81   |           | 0.19    | 2670 | ISO14184-1 | 117.4    |         | 3.19    |
| 2363 | ISO14184-1          | 94.20   |           | 0.11    | 2674 | ISO14184-1 | 92.8     |         | -0.07   |
| 2364 | ISO14184-1          | 98.88   |           | 0.73    | 2678 | ISO14184-1 | 84       |         | -1.24   |
| 2365 | ISO14184-1          | 95.0    |           | 0.22    | 2685 | ISO14184-1 | 110.58   | C       | 2.28    |
| 2366 | ISO14184-1          | 97.77   |           | 0.59    | 2689 | ISO14184-1 | 105.37   |         | 1.59    |
| 2367 | ISO14184-1          | 106.5   |           | 1.74    | 2700 | ISO14184-1 | 82.19    |         | -1.48   |
| 2368 | ISO14184-1          | 95.02   |           | 0.22    | 2702 | ISO14184-1 | 97.48    |         | 0.55    |
| 2370 | ISO14184-1          | 91.15   |           | -0.29   | 2719 | ISO14184-1 | 90.29    |         | -0.41   |
| 2373 | ISO14184-1          | 86.17   |           | -0.95   | 2728 | ISO14184-1 | 90.08    |         | -0.43   |
| 2375 | ISO14184-1          | 82.5    | C         | -1.44   | 2730 | ISO14184-1 | 101.29   |         | 1.05    |

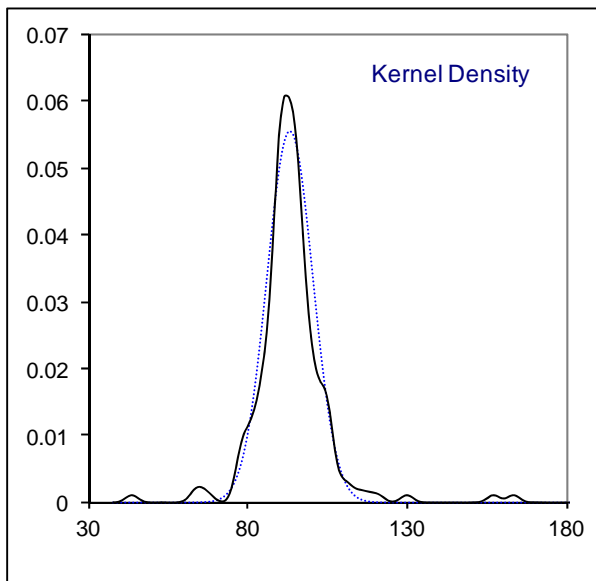
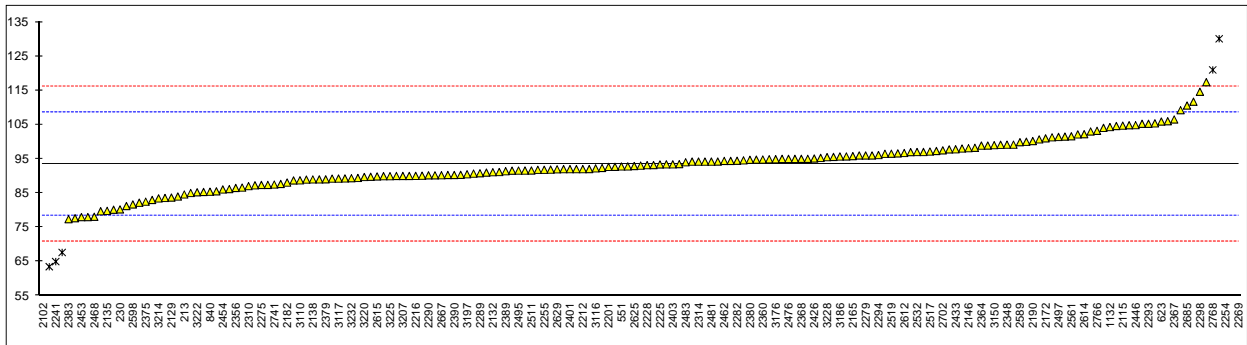
|      |                |        |                    |      |             |         |            |
|------|----------------|--------|--------------------|------|-------------|---------|------------|
| 2741 | ISO14184-1     | 87.5   | -0.78              | 3182 | ISO14184-1  | 96.00   | 0.35       |
| 2749 |                | -----  | -----              | 3186 | ISO14184-1  | 95.7    | 0.31       |
| 2755 | ISO14184-1     | 95     | 0.22               | 3190 | ISO14184-1  | 90      | -0.44      |
| 2759 | ISO14184-1     | 91.587 | -0.23              | 3191 | GB/T2912    | 91.8658 | -0.20      |
| 2761 | ISO14184-1     | 85.03  | -1.10              | 3195 | ISO14184-1  | 100     | 0.88       |
| 2763 | ISO14184-1     | 78     | -2.03              | 3197 | ISO14184-1  | 90.5    | -0.38      |
| 2766 | ISO14184-1     | 103.2  | 1.30               | 3200 | ISO14184-1  | 90.2    | -0.42      |
| 2767 | ISO14184-1     | 63.5   | C,R(0.05)<br>-3.96 | 3207 | JIS L1041   | 90      | -0.44      |
| 2768 | ISO14184-1     | 120.97 | R(0.05)<br>3.66    | 3210 | ISO14184-1  | 93.475  | 0.02       |
| 3110 | ST part 3 2016 | 88.733 | -0.61              | 3212 | ISO14184-1  | 94.78   | 0.19       |
| 3116 | ISO14184-1     | 92.22  | -0.15              | 3214 | ISO14184-1  | 83.45   | -1.31      |
| 3117 | ISO14184-1     | 89.25  | -0.54              | 3220 | ISO14184-1  | 89.7    | C<br>-0.48 |
| 3118 | ISO14184-1     | 98.90  | 0.73               | 3222 | ISO14184-1  | 85.25   | -1.07      |
| 3146 | ISO14184-1     | 88.7   | -0.62              | 3225 | ISO14184-1  | 89.95   | -0.45      |
| 3149 | ISO14184-1     | 163.5  | R(0.01)<br>9.30    | 3228 | ISO14184-1  | 95.5    | 0.28       |
| 3150 | ISO14184-1     | 99     | 0.75               | 3232 | ISO14184-1  | 89.35   | -0.53      |
| 3153 | ISO14184-1     | 89.28  | -0.54              | 3237 | ISO14184-1  | 98.23   | 0.65       |
| 3154 | ISO14184-1     | 83.58  | -1.30              | 3238 |             | -----   | -----      |
| 3167 | ISO14184-1     | 99.15  | 0.77               | 3248 | GB/T2912    | 90      | -0.44      |
| 3172 | ISO14184-1     | 89.42  | -0.52              | 8005 | JIS L1041-B | 92.68   | -0.09      |
| 3176 | ISO14184-1     | 94.9   | 0.20               | 8008 | ISO14184-1  | 93.032  | -0.04      |

normality OK  
n 178  
outliers 9  
mean (n) 93.355  
st.dev. (n) 7.2026 RSD = 8%  
R(cal.) 20.167  
R(Horwitz) 21.129

Compare estimated R(ISO14184-1:11) = 6.535

Lab 2135 first reported: 61.60  
Lab 2139 first reported: 59.67  
Lab 2241 first reported: 62.02  
Lab 2375 first reported: 62.5

Lab 2497 first reported: 135.42  
Lab 2685 first reported: 120.035  
Lab 2767 first reported: 127  
Lab 3220 first reported: 139.8



## Determination of Released Formaldehyde content on sample #16630; results in mg/kg

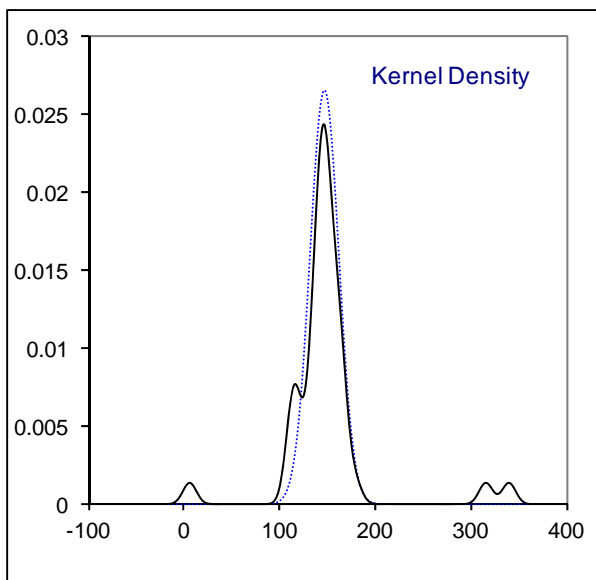
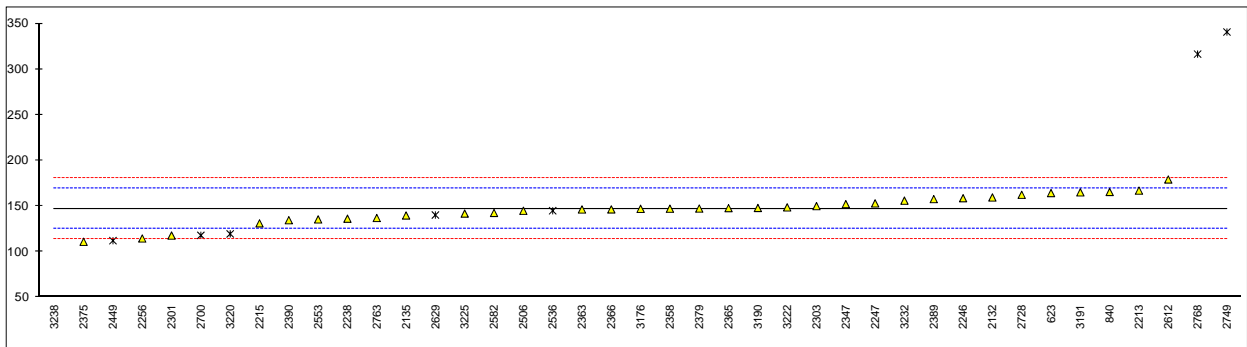
| lab  | method     | value   | mark | z(targ) | lab  | method      | value    | mark | z(targ) |
|------|------------|---------|------|---------|------|-------------|----------|------|---------|
| 213  |            | ----    |      | ----    | 2379 | ISO14184-2  | 147.344  |      | 0.02    |
| 230  |            | ----    |      | ----    | 2380 |             | ----     |      | ----    |
| 348  |            | ----    |      | ----    | 2381 |             | ----     |      | ----    |
| 362  |            | ----    |      | ----    | 2383 |             | ----     |      | ----    |
| 551  |            | ----    |      | ----    | 2385 |             | ----     |      | ----    |
| 622  |            | ----    |      | ----    | 2389 | ISO14184-2  | 157.7    |      | 0.95    |
| 623  | ISO14184-2 | 164.3   |      | 1.54    | 2390 | ISO14184-2  | 134.6    |      | -1.13   |
| 840  | ISO14184-2 | 165.5   |      | 1.65    | 2401 |             | ----     |      | ----    |
| 1132 |            | ----    |      | ----    | 2403 |             | ----     |      | ----    |
| 2102 |            | ----    |      | ----    | 2404 |             | ----     |      | ----    |
| 2115 |            | ----    |      | ----    | 2423 |             | ----     |      | ----    |
| 2129 |            | ----    |      | ----    | 2426 |             | ----     |      | ----    |
| 2132 | ISO14184-2 | 159.50  |      | 1.11    | 2429 |             | ----     |      | ----    |
| 2135 | ISO14184-2 | 139.72  |      | -0.67   | 2432 |             | ----     |      | ----    |
| 2138 |            | ----    |      | ----    | 2433 |             | ----     |      | ----    |
| 2139 |            | ----    |      | ----    | 2439 |             | ----     |      | ----    |
| 2146 |            | ----    |      | ----    | 2442 |             | ----     |      | ----    |
| 2159 |            | ----    |      | ----    | 2446 |             | ----     |      | ----    |
| 2165 |            | ----    |      | ----    | 2449 | ISO14181-1  | 112.152  | ex   | -3.15   |
| 2170 |            | ----    |      | ----    | 2453 |             | ----     |      | ----    |
| 2172 |            | ----    |      | ----    | 2454 |             | ----     |      | ----    |
| 2182 |            | ----    |      | ----    | 2456 |             | ----     |      | ----    |
| 2184 |            | ----    |      | ----    | 2462 |             | ----     |      | ----    |
| 2190 |            | ----    |      | ----    | 2467 |             | ----     |      | ----    |
| 2201 |            | ----    |      | ----    | 2468 |             | ----     |      | ----    |
| 2212 |            | ----    |      | ----    | 2474 |             | ----     |      | ----    |
| 2213 | ISO14184-2 | 167     |      | 1.79    | 2475 |             | ----     |      | ----    |
| 2215 | ISO14184-2 | 131.18  |      | -1.44   | 2476 |             | ----     |      | ----    |
| 2216 |            | ----    |      | ----    | 2481 |             | ----     |      | ----    |
| 2225 |            | ----    |      | ----    | 2483 |             | ----     |      | ----    |
| 2226 |            | ----    |      | ----    | 2489 |             | ----     |      | ----    |
| 2228 |            | ----    |      | ----    | 2495 |             | ----     |      | ----    |
| 2236 |            | ----    |      | ----    | 2497 |             | ----     |      | ----    |
| 2238 | ISO14184-2 | 136.26  |      | -0.98   | 2506 | ISO14184-2  | 144.91   |      | -0.20   |
| 2241 |            | ----    |      | ----    | 2511 |             | ----     |      | ----    |
| 2245 |            | ----    |      | ----    | 2514 |             | ----     |      | ----    |
| 2246 | ISO14184-2 | 158.7   |      | 1.04    | 2517 |             | ----     |      | ----    |
| 2247 | ISO14184-2 | 153.0   |      | 0.53    | 2519 |             | ----     |      | ----    |
| 2254 |            | ----    |      | ----    | 2520 |             | ----     |      | ----    |
| 2255 |            | ----    |      | ----    | 2527 |             | ----     |      | ----    |
| 2256 | ISO14184-2 | 114.55  |      | -2.94   | 2532 |             | ----     |      | ----    |
| 2269 |            | ----    |      | ----    | 2534 |             | ----     |      | ----    |
| 2275 |            | ----    |      | ----    | 2536 | AATCC112    | 144.9232 | ex   | -0.20   |
| 2277 |            | ----    |      | ----    | 2546 |             | ----     |      | ----    |
| 2279 |            | ----    |      | ----    | 2553 | ISO14184-2  | 135.456  |      | -1.05   |
| 2280 |            | ----    |      | ----    | 2561 |             | ----     |      | ----    |
| 2282 |            | ----    |      | ----    | 2563 |             | ----     |      | ----    |
| 2289 |            | ----    |      | ----    | 2567 |             | ----     |      | ----    |
| 2290 |            | ----    |      | ----    | 2569 |             | ----     |      | ----    |
| 2293 |            | ----    |      | ----    | 2572 |             | ----     |      | ----    |
| 2294 |            | ----    |      | ----    | 2582 | ISO14184-2  | 142.54   |      | -0.42   |
| 2295 |            | ----    |      | ----    | 2589 |             | ----     |      | ----    |
| 2296 |            | ----    |      | ----    | 2590 |             | ----     |      | ----    |
| 2298 |            | ----    |      | ----    | 2591 |             | ----     |      | ----    |
| 2301 | ISO14184-2 | 117.765 |      | -2.65   | 2596 |             | ----     |      | ----    |
| 2303 | ISO14184-2 | 149.98  |      | 0.25    | 2598 |             | ----     |      | ----    |
| 2310 |            | ----    |      | ----    | 2606 |             | ----     |      | ----    |
| 2311 |            | ----    |      | ----    | 2612 | ISO14184-2  | 179.19   |      | 2.88    |
| 2313 |            | ----    |      | ----    | 2614 |             | ----     |      | ----    |
| 2314 |            | ----    |      | ----    | 2615 |             | ----     |      | ----    |
| 2330 |            | ----    |      | ----    | 2625 |             | ----     |      | ----    |
| 2347 | ISO14184-2 | 152.21  |      | 0.46    | 2629 | AATCC TM112 | 140.236  | ex   | -0.62   |
| 2348 |            | ----    |      | ----    | 2638 |             | ----     |      | ----    |
| 2351 |            | ----    |      | ----    | 2644 |             | ----     |      | ----    |
| 2356 |            | ----    |      | ----    | 2646 |             | ----     |      | ----    |
| 2358 | ISO14184-2 | 147.2   |      | 0.00    | 2667 |             | ----     |      | ----    |
| 2360 |            | ----    |      | ----    | 2670 |             | ----     |      | ----    |
| 2363 | ISO14184-2 | 146.35  |      | -0.07   | 2674 |             | ----     |      | ----    |
| 2364 |            | ----    |      | ----    | 2678 |             | ----     |      | ----    |
| 2365 | ISO14184-2 | 147.8   |      | 0.06    | 2685 |             | ----     |      | ----    |
| 2366 | ISO14184-2 | 146.40  |      | -0.07   | 2689 |             | ----     |      | ----    |
| 2367 |            | ----    |      | ----    | 2700 | AATCC112    | 118.00   | ex   | -2.62   |
| 2368 |            | ----    |      | ----    | 2702 |             | ----     |      | ----    |
| 2370 |            | ----    |      | ----    | 2719 |             | ----     |      | ----    |
| 2373 |            | ----    |      | ----    | 2728 | ISO14184-2  | 162.40   | C    | 1.37    |
| 2375 | ISO14184-2 | 110.95  |      | -3.26   | 2730 |             | ----     |      | ----    |

|             |            |          |         |           |      |            |          |      |        |
|-------------|------------|----------|---------|-----------|------|------------|----------|------|--------|
| 2741        |            | ----     |         | ----      | 3182 |            |          | ---- |        |
| 2749        | ISO14184-2 | 340.7    | R(0.01) | 17.42     | 3186 |            |          | ---- |        |
| 2755        |            | ----     |         | ----      | 3190 | ISO14184-2 | 148      |      | 0.08   |
| 2759        |            | ----     |         | ----      | 3191 | GB/T2912   | 165.0888 | C    | 1.61   |
| 2761        |            | ----     |         | ----      | 3195 |            |          | ---- |        |
| 2763        | ISO14184-2 | 137      |         | -0.91     | 3197 |            |          | ---- |        |
| 2766        |            | ----     |         | ----      | 3200 |            |          | ---- |        |
| 2767        |            | ----     |         | ----      | 3207 |            |          | ---- |        |
| 2768        | ISO14184-2 | 316.51   | R(0.01) | 15.25     | 3210 |            |          | ---- |        |
| 3110        |            | ----     |         | ----      | 3212 |            |          | ---- |        |
| 3116        |            | ----     |         | ----      | 3214 |            |          | ---- |        |
| 3117        |            | ----     |         | ----      | 3220 | ISO14184-2 | 119.6    | ex   | -2.48  |
| 3118        |            | ----     |         | ----      | 3222 | ISO14184-2 | 148.64   |      | 0.13   |
| 3146        |            | ----     |         | ----      | 3225 | ISO14184-2 | 141.87   |      | -0.48  |
| 3149        |            | ----     |         | ----      | 3228 |            |          | ---- |        |
| 3150        |            | ----     |         | ----      | 3232 | ISO14184-2 | 156.0    |      | 0.80   |
| 3153        |            | ----     |         | ----      | 3237 |            |          | ---- |        |
| 3154        |            | ----     |         | ----      | 3238 | In house   | 5.79     | ex   | -12.73 |
| 3167        |            | ----     |         | ----      | 3248 |            |          | ---- |        |
| 3172        |            | ----     |         | ----      | 8005 |            |          | ---- |        |
| 3176        | ISO14184-2 | 147.04   |         | -0.01     | 8008 |            |          | ---- |        |
| normality   |            | OK       |         |           |      |            |          |      |        |
| n           |            | 33       |         |           |      |            |          |      |        |
| outliers    |            | 2 (+6ex) |         |           |      |            |          |      |        |
| mean (n)    |            | 147.156  |         |           |      |            |          |      |        |
| st.dev. (n) |            | 15.0735  |         | RSD = 10% |      |            |          |      |        |
| R(calc.)    |            | 42.206   |         |           |      |            |          |      |        |
| R(Horwitz)  |            | 31.101   |         |           |      |            |          |      |        |

Compare estimated R (ISO14184-2:11) = 80.3

Lab 2728 first reported: 3721.5

Test result of lab 2449 was excluded as ISO14184-1 was performed, which determines Free Formaldehyde and not released.  
 Test result of lab 2536, 2629, 2700, 3220 and 3238 were excluded as a higher temperature than 40°C was used for the development of the color (see §4).



## Determination of Free Formaldehyde content on sample #16631; results in mg/kg

| lab  | method               | value   | mark      | z(targ) | lab  | method     | value    | mark    | z(targ) |
|------|----------------------|---------|-----------|---------|------|------------|----------|---------|---------|
| 213  | ISO14184-1           | 288.4   |           | -1.41   | 2379 | ISO14184-1 | 310.029  |         | -0.40   |
| 230  |                      | 358.66  |           | 1.87    | 2380 | ISO14184-1 | 298.82   |         | -0.92   |
| 348  | In house             | 343.337 |           | 1.16    | 2381 | ISO14184-1 | 301.11   |         | -0.82   |
| 362  | ISO14184-1           | 277.72  |           | -1.91   | 2383 | ISO14184-1 | 324      |         | 0.25    |
| 551  | ISO14184-1           | 277.33  |           | -1.93   | 2385 | ISO14184-1 | 370      |         | 2.40    |
| 622  | ISO14184-1           | 317.26  |           | -0.06   | 2389 | ISO14184-1 | 317.7    |         | -0.04   |
| 623  | ISO14184-1           | 394.2   |           | 3.53    | 2390 | ISO14184-1 | 264.7    |         | -2.52   |
| 840  | ISO14184-1           | 283.9   |           | -1.62   | 2401 | GB/T2912   | 322      |         | 0.16    |
| 1132 | In house             | 406.490 |           | 4.10    | 2403 | ISO14184-1 | 328.8    |         | 0.48    |
| 2102 | In house             | 331.25  |           | 0.59    | 2404 | ISO14184-1 | 328.67   |         | 0.47    |
| 2115 | ISO14184-1           | 326.2   |           | 0.35    | 2423 | ISO14184-1 | 355.39   |         | 1.72    |
| 2129 | ISO14184-1           | 264.7   |           | -2.52   | 2426 | ISO14184-1 | 324.1    |         | 0.26    |
| 2132 | ISO14184-1           | 316.2   |           | -0.11   | 2429 | ISO14184-1 | 286.74   |         | -1.49   |
| 2135 | ISO14184-1           | 58.2    | C,R(0.01) | -12.16  | 2432 | ISO14184-1 | 286.525  |         | -1.50   |
| 2138 | ISO14184-1           | 290.575 |           | -1.31   | 2433 | ISO14184-1 | 332.04   |         | 0.63    |
| 2139 | ISO14184-1           | 293.00  |           | -1.20   | 2439 | ISO14184-1 | 347.046  |         | 1.33    |
| 2146 | ISO14184-1           | 304.77  |           | -0.65   | 2442 | ISO14184-1 | 275.06   |         | -2.03   |
| 2159 |                      | -----   |           | -----   | 2446 |            | 329.93   |         | 0.53    |
| 2165 | ISO14184-1           | 309.50  |           | -0.43   | 2449 | ISO14184-1 | 322.008  |         | 0.16    |
| 2170 | ISO14184-1           | 310.708 |           | -0.37   | 2453 | ISO14184-1 | 261.5    |         | -2.67   |
| 2172 | ISO14184-1           | 319.89  |           | 0.06    | 2454 | ISO14184-1 | 317.26   |         | -0.06   |
| 2182 | ISO14184-1           | 292.23  |           | -1.23   | 2456 | ISO14184-1 | 322.25   |         | 0.17    |
| 2184 | ISO14184-1           | 310.1   |           | -0.40   | 2462 | ISO14184-1 | 326.9    |         | 0.39    |
| 2190 | ISO14184-1           | 355.1   |           | 1.70    | 2467 | ISO14184-1 | 306.863  |         | -0.55   |
| 2201 | ISO14184-1           | 312.58  |           | -0.28   | 2468 | ISO14184-1 | 251.5    |         | -3.13   |
| 2212 | JIS L1041            | 294.6   |           | -1.12   | 2474 | ISO14184-1 | 322.00   |         | 0.16    |
| 2213 | ISO14184-1           | 305.3   |           | -0.62   | 2475 | ISO14184-1 | 291.327  |         | -1.27   |
| 2215 | ISO14184-1           | 298.75  |           | -0.93   | 2476 | ISO14184-1 | 340.0    |         | 1.00    |
| 2216 | JIS L1041/ISO14184-1 | 340.27  |           | 1.01    | 2481 | ISO14184-1 | 323.5    |         | 0.23    |
| 2225 | ISO14184-1           | 323.70  |           | 0.24    | 2483 | ISO14184-1 | 306      |         | -0.59   |
| 2226 | ISO14184-1           | 344.767 |           | 1.22    | 2489 | ISO14184-1 | 360.4    |         | 1.95    |
| 2228 |                      | -----   |           | -----   | 2495 | ISO14184-1 | 316.1    |         | -0.12   |
| 2236 | ISO14184-1           | 420.41  | R(0.05)   | 4.76    | 2497 | ISO14184-1 | 333.26   |         | 0.68    |
| 2238 | ISO14184-1           | 313.78  |           | -0.23   | 2506 | ISO14184-1 | 332.83   |         | 0.66    |
| 2241 | ISO14184-1           | 306.52  |           | -0.56   | 2511 | GB/T2912   | 303.7    |         | -0.70   |
| 2245 | ISO14184-1           | 325.5   |           | 0.32    | 2514 | ISO14184-1 | 329.0165 |         | 0.49    |
| 2246 | ISO14184-1           | 314.75  |           | -0.18   | 2517 | ISO14184-1 | 333.20   |         | 0.68    |
| 2247 | ISO14184-1           | 342.9   |           | 1.13    | 2519 | ISO14184-1 | 311.6    |         | -0.33   |
| 2254 | ISO14184-1           | 492.017 | R(0.01)   | 8.10    | 2520 |            | -----    |         | -----   |
| 2255 | ISO14184-1           | 332.13  |           | 0.63    | 2527 | ISO14184-1 | 308      |         | -0.50   |
| 2256 | ISO14184-1           | 315.36  |           | -0.15   | 2532 | ISO14184-1 | 299      |         | -0.92   |
| 2269 | ISO14184-1           | 333.700 |           | 0.70    | 2534 | GB/T2912   | 352.78   |         | 1.60    |
| 2275 | ISO14184-1           | 304.00  |           | -0.68   | 2536 | ISO14184-1 | 329.4734 |         | 0.51    |
| 2277 | ISO14184-1           | 348.4   |           | 1.39    | 2546 | ISO14184-1 | 291.5606 |         | -1.26   |
| 2279 | ISO14184-1           | 340     |           | 1.00    | 2553 | ISO14184-1 | 280.213  |         | -1.79   |
| 2280 | ISO14184-1           | 331.91  |           | 0.62    | 2561 | ISO14184-1 | 309.0    |         | -0.45   |
| 2282 | ISO14184-1           | 308.03  |           | -0.49   | 2563 | ISO14184-1 | 337.6    |         | 0.89    |
| 2289 | ISO14184-1           | 297.50  |           | -0.99   | 2567 | ISO14184-1 | 330.75   |         | 0.57    |
| 2290 | ISO14184-1           | 298.3   |           | -0.95   | 2569 | ISO14184-1 | 299      |         | -0.92   |
| 2293 | ISO14184-1           | 381.97  |           | 2.96    | 2572 | ISO14184-1 | 307.8    |         | -0.50   |
| 2294 | JIS L1041            | 340.30  |           | 1.01    | 2582 | ISO14184-1 | 355.77   |         | 1.74    |
| 2295 | ISO14184-1           | 309.9   |           | -0.41   | 2589 | ISO14184-1 | 335.65   |         | 0.80    |
| 2296 |                      | -----   |           | -----   | 2590 | ISO14184-1 | 350.05   |         | 1.47    |
| 2298 | JIS L1041            | 389.9   |           | 3.33    | 2591 | In house   | 356.65   |         | 1.78    |
| 2301 |                      | -----   |           | -----   | 2596 | GB/T2912   | 273.4    |         | -2.11   |
| 2303 | ISO14184-1           | 350.76  |           | 1.50    | 2598 | ISO14184-1 | 336.63   |         | 0.84    |
| 2310 | ISO14184-1           | 302     |           | -0.78   | 2606 | ISO14184-1 | 313.18   |         | -0.25   |
| 2311 | ISO14184-1           | 295.3   |           | -1.09   | 2612 | ISO14184-1 | 351.09   |         | 1.52    |
| 2313 | ISO14184-1           | 306.2   |           | -0.58   | 2614 | ISO14184-1 | 301.2    |         | -0.81   |
| 2314 | ISO14184-1           | 307.2   |           | -0.53   | 2615 | ISO14184-1 | 323.41   |         | 0.22    |
| 2330 | ISO14184-1           | 382.26  |           | 2.97    | 2625 | ISO14184-1 | 258.7    |         | -2.80   |
| 2347 | ISO14184-1           | 302.73  |           | -0.74   | 2629 | ISO14184-1 | 315.363  |         | -0.15   |
| 2348 | ISO14184-1           | 339.55  |           | 0.98    | 2638 | ISO14184-1 | 304.57   |         | -0.66   |
| 2351 | ISO14184-1           | 356     |           | 1.75    | 2644 | ISO14184-1 | 283.58   |         | -1.64   |
| 2356 | ISO14184-1           | 300.4   |           | -0.85   | 2646 | ISO14184-1 | 324.5    |         | 0.28    |
| 2358 | ISO14184-1           | 337.7   |           | 0.89    | 2667 | ISO14184-1 | 318.21   |         | -0.02   |
| 2360 | ISO14184-1           | 319.79  |           | 0.06    | 2670 | ISO14184-1 | 303.3    |         | -0.72   |
| 2363 | ISO14184-1           | 313.32  |           | -0.25   | 2674 | ISO14184-1 | 307.6    |         | -0.51   |
| 2364 | ISO14184-1           | 357.00  |           | 1.79    | 2678 | ISO14184-1 | 317      |         | -0.08   |
| 2365 | ISO14184-1           | 306.4   |           | -0.57   | 2685 | ISO14184-1 | 307.759  |         | -0.51   |
| 2366 | ISO14184-1           | 310.68  |           | -0.37   | 2689 | ISO14184-1 | 383.45   |         | 3.03    |
| 2367 | ISO14184-1           | 353.5   |           | 1.63    | 2700 | ISO14184-1 | 265.99   |         | -2.46   |
| 2368 | ISO14184-1           | 335.16  |           | 0.77    | 2702 | ISO14184-1 | 308.37   |         | -0.48   |
| 2370 | ISO14184-1           | 303.69  |           | -0.70   | 2719 | ISO14184-1 | 303.38   |         | -0.71   |
| 2373 | ISO14184-1           | 345.42  |           | 1.25    | 2728 | ISO14184-1 | 1678.00  | R(0.01) | 63.50   |
| 2375 | ISO14184-1           | 279.8   |           | -1.81   | 2730 | ISO14184-1 | 304.56   |         | -0.66   |

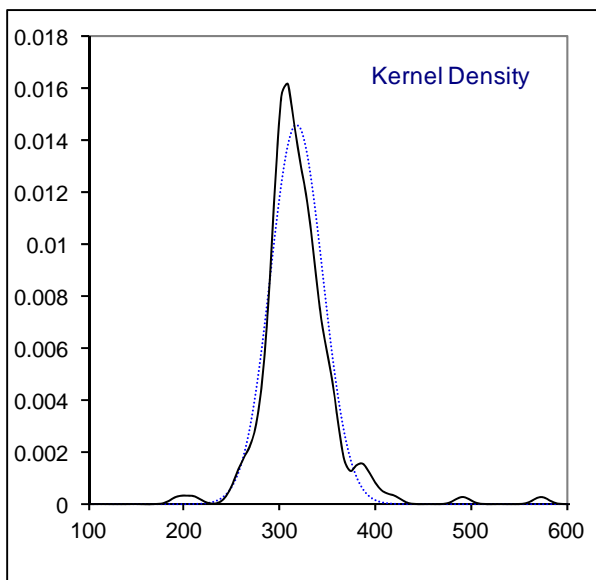
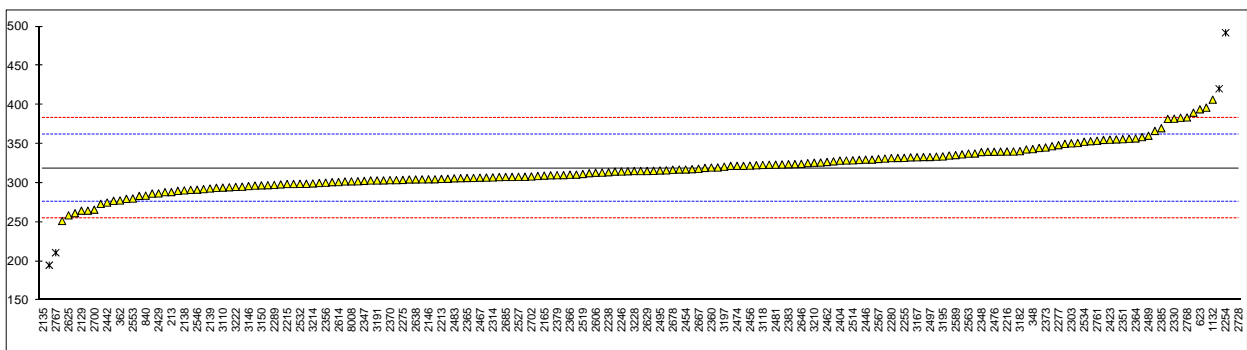


|      |                |         |           |      |             |            |       |
|------|----------------|---------|-----------|------|-------------|------------|-------|
| 2741 | ISO14184-1     | 304.7   | -0.65     | 3182 | ISO14184-1  | 340.67     | 1.03  |
| 2749 |                | -----   | -----     | 3186 | ISO14184-1  | 340.2      | 1.01  |
| 2755 | ISO14184-1     | 290     | -1.34     | 3190 |             | 315 C      | -0.17 |
| 2759 | ISO14184-1     | 319.304 | 0.03      | 3191 | ISO14184-1  | 303.3166 C | -0.71 |
| 2761 | ISO14184-1     | 354.02  | 1.65      | 3195 | ISO14184-1  | 334        | 0.72  |
| 2763 | ISO14184-1     | 195     | C,R(0.01) | 3197 | ISO14184-1  | 320.9      | 0.11  |
| 2766 | ISO14184-1     | 297.2   | -1.00     | 3200 | ISO14184-1  | 307.0      | -0.54 |
| 2767 | ISO14184-1     | 211     | C,R(0.05) | 3207 | JIS L1041   | 305.4      | -0.62 |
| 2768 | ISO14184-1     | 383.79  | 3.04      | 3210 | ISO14184-1  | 325.96     | 0.34  |
| 3110 | ST part 3 2016 | 294.135 | -1.14     | 3212 | ISO14184-1  | 302.24     | -0.76 |
| 3116 | ISO14184-1     | 329.96  | 0.53      | 3214 | ISO14184-1  | 299.45     | -0.89 |
| 3117 | ISO14184-1     | 288.30  | -1.42     | 3220 | ISO14184-1  | 396.3      | 3.63  |
| 3118 | ISO14184-1     | 323.07  | 0.21      | 3222 | ISO14184-1  | 295.04     | -1.10 |
| 3146 | ISO14184-1     | 296.1   | -1.05     | 3225 | ISO14184-1  | 366.53     | 2.24  |
| 3149 | ISO14184-1     | 574.1   | R(0.01)   | 3228 | ISO14184-1  | 315.3      | -0.15 |
| 3150 | ISO14184-1     | 297     | -1.01     | 3232 | ISO14184-1  | 296.76     | -1.02 |
| 3153 | ISO14184-1     | 293.89  | -1.15     | 3237 | ISO14184-1  | 304.78     | -0.65 |
| 3154 | ISO14184-1     | 322.68  | 0.19      | 3238 |             | -----      | ----- |
| 3167 | ISO14184-1     | 332.94  | 0.67      | 3248 | GB/T2912    | 300        | -0.87 |
| 3172 | ISO14184-1     | 315.57  | -0.14     | 8005 | JIS L1041-B | 327.67     | 0.42  |
| 3176 | ISO14184-1     | 314.6   | -0.19     | 8008 | ISO14184-1  | 302.153    | -0.77 |

normality OK  
 n 180  
 outliers 7  
 mean (n) 318.609  
 st.dev. (n) 27.2686 RSD = 9%  
 R(calc.) 76.352  
 R(Horwitz) 60.187

Compare estimated R(ISO14184-1:11) = 17.842

Lab 2135 first reported: 45.11  
 Lab 2763 first reported: 226  
 Lab 2767 first reported: 422  
 Lab 3190 first reported result as Released Formaldehyde  
 Lab 3191 first reported: 998.3207



## Determination of Released Formaldehyde content on sample #16631; results in mg/kg

| lab  | method     | value   | mark    | z(targ) | lab  | method     | value    | mark    | z(targ) |
|------|------------|---------|---------|---------|------|------------|----------|---------|---------|
| 213  |            | ----    |         | ----    | 2379 | ISO14184-2 | 961.959  |         | 0.90    |
| 230  |            | ----    |         | ----    | 2380 |            | ----     |         | ----    |
| 348  |            | ----    |         | ----    | 2381 |            | ----     |         | ----    |
| 362  |            | ----    |         | ----    | 2383 |            | ----     |         | ----    |
| 551  |            | ----    |         | ----    | 2385 |            | ----     |         | ----    |
| 622  |            | ----    |         | ----    | 2389 | ISO14184-2 | 1037.1   |         | 2.33    |
| 623  | ISO14184-2 | 954.9   |         | 0.76    | 2390 | ISO14184-2 | 1048.0   |         | 2.54    |
| 840  | ISO14184-2 | 978.9   |         | 1.22    | 2401 |            | ----     |         | ----    |
| 1132 |            | ----    |         | ----    | 2403 |            | ----     |         | ----    |
| 2102 |            | ----    |         | ----    | 2404 |            | ----     |         | ----    |
| 2115 |            | ----    |         | ----    | 2423 |            | ----     |         | ----    |
| 2129 |            | ----    |         | ----    | 2426 |            | ----     |         | ----    |
| 2132 | ISO14184-2 | 952.90  |         | 0.72    | 2429 |            | ----     |         | ----    |
| 2135 | ISO14184-2 | 847.8   |         | -1.28   | 2432 |            | ----     |         | ----    |
| 2138 |            | ----    |         | ----    | 2433 |            | ----     |         | ----    |
| 2139 |            | ----    |         | ----    | 2439 |            | ----     |         | ----    |
| 2146 |            | ----    |         | ----    | 2442 |            | ----     |         | ----    |
| 2159 | In house   | 913.03  |         | -0.04   | 2446 |            | ----     |         | ----    |
| 2165 |            | ----    |         | ----    | 2449 | ISO14184-1 | 352.112  | ex      | -10.73  |
| 2170 |            | ----    |         | ----    | 2453 |            | ----     |         | ----    |
| 2172 |            | ----    |         | ----    | 2454 |            | ----     |         | ----    |
| 2182 |            | ----    |         | ----    | 2456 |            | ----     |         | ----    |
| 2184 |            | ----    |         | ----    | 2462 |            | ----     |         | ----    |
| 2190 |            | ----    |         | ----    | 2467 |            | ----     |         | ----    |
| 2201 |            | ----    |         | ----    | 2468 |            | ----     |         | ----    |
| 2212 |            | ----    |         | ----    | 2474 |            | ----     |         | ----    |
| 2213 | ISO14184-2 | 920.1   |         | 0.10    | 2475 |            | ----     |         | ----    |
| 2215 | ISO14184-2 | 1015.06 |         | 1.91    | 2476 |            | ----     |         | ----    |
| 2216 |            | ----    |         | ----    | 2481 |            | ----     |         | ----    |
| 2225 |            | ----    |         | ----    | 2483 |            | ----     |         | ----    |
| 2226 |            | ----    |         | ----    | 2489 |            | ----     |         | ----    |
| 2228 | AATCC112   | 618.303 | ex      | -5.66   | 2495 |            | ----     |         | ----    |
| 2236 |            | ----    |         | ----    | 2497 |            | ----     |         | ----    |
| 2238 |            | ----    |         | ----    | 2506 |            | ----     |         | ----    |
| 2241 |            | ----    |         | ----    | 2511 |            | ----     |         | ----    |
| 2245 |            | ----    |         | ----    | 2514 |            | ----     |         | ----    |
| 2246 | ISO14184-2 | 950.5   |         | 0.68    | 2517 |            | ----     |         | ----    |
| 2247 | ISO14184-2 | 917.5   |         | 0.05    | 2519 |            | ----     |         | ----    |
| 2254 |            | ----    |         | ----    | 2520 |            | ----     |         | ----    |
| 2255 |            | ----    |         | ----    | 2527 |            | ----     |         | ----    |
| 2256 | ISO14184-2 | 768.86  |         | -2.79   | 2532 |            | ----     |         | ----    |
| 2269 |            | ----    |         | ----    | 2534 |            | ----     |         | ----    |
| 2275 |            | ----    |         | ----    | 2536 | AATCC112   | 744.2557 | ex      | -3.25   |
| 2277 |            | ----    |         | ----    | 2546 |            | ----     |         | ----    |
| 2279 |            | ----    |         | ----    | 2553 | ISO14184-2 | 800.584  |         | -2.18   |
| 2280 |            | ----    |         | ----    | 2561 |            | ----     |         | ----    |
| 2282 |            | ----    |         | ----    | 2563 |            | ----     |         | ----    |
| 2289 |            | ----    |         | ----    | 2567 |            | ----     |         | ----    |
| 2290 |            | ----    |         | ----    | 2569 |            | ----     |         | ----    |
| 2293 |            | ----    |         | ----    | 2572 |            | ----     |         | ----    |
| 2294 |            | ----    |         | ----    | 2582 | ISO14184-2 | 801.93   |         | -2.16   |
| 2295 |            | ----    |         | ----    | 2589 |            | ----     |         | ----    |
| 2296 |            | ----    |         | ----    | 2590 |            | ----     |         | ----    |
| 2298 |            | ----    |         | ----    | 2591 |            | ----     |         | ----    |
| 2301 | ISO14184-2 | 445.790 | R(0.01) | -8.94   | 2596 |            | ----     |         | ----    |
| 2303 | ISO14184-2 | 811.99  |         | -1.96   | 2598 |            | ----     |         | ----    |
| 2310 |            | ----    |         | ----    | 2606 |            | ----     |         | ----    |
| 2311 |            | ----    |         | ----    | 2612 | ISO14184-2 | 856.02   |         | -1.12   |
| 2313 |            | ----    |         | ----    | 2614 |            | ----     |         | ----    |
| 2314 |            | ----    |         | ----    | 2615 |            | ----     |         | ----    |
| 2330 |            | ----    |         | ----    | 2625 |            | ----     |         | ----    |
| 2347 | ISO14184-2 | 1090.55 |         | 3.35    | 2629 |            | ----     |         | ----    |
| 2348 |            | ----    |         | ----    | 2638 |            | ----     |         | ----    |
| 2351 |            | ----    |         | ----    | 2644 |            | ----     |         | ----    |
| 2356 |            | ----    |         | ----    | 2646 |            | ----     |         | ----    |
| 2358 | ISO14184-2 | 907.0   |         | -0.15   | 2667 |            | ----     |         | ----    |
| 2360 |            | ----    |         | ----    | 2670 |            | ----     |         | ----    |
| 2363 | ISO14184-2 | 855.31  |         | -1.14   | 2674 |            | ----     |         | ----    |
| 2364 |            | ----    |         | ----    | 2678 |            | ----     |         | ----    |
| 2365 | ISO14184-2 | 881.0   |         | -0.65   | 2685 |            | ----     |         | ----    |
| 2366 | ISO14184-2 | 851.34  |         | -1.21   | 2689 |            | ----     |         | ----    |
| 2367 |            | ----    |         | ----    | 2700 | AATCC112   | 690.67   | ex      | -4.28   |
| 2368 |            | ----    |         | ----    | 2702 |            | ----     |         | ----    |
| 2370 |            | ----    |         | ----    | 2719 |            | ----     |         | ----    |
| 2373 |            | ----    |         | ----    | 2728 | ISO14184-2 | 3721.15  | R(0.01) | 53.49   |
| 2375 |            | ----    |         | ----    | 2730 |            | ----     |         | ----    |

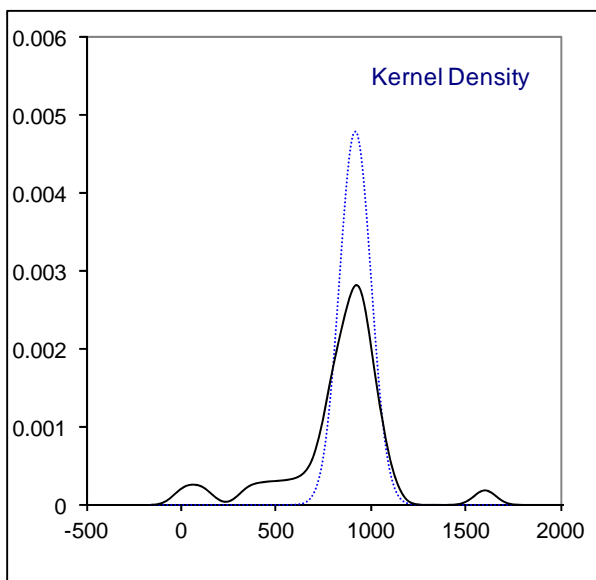
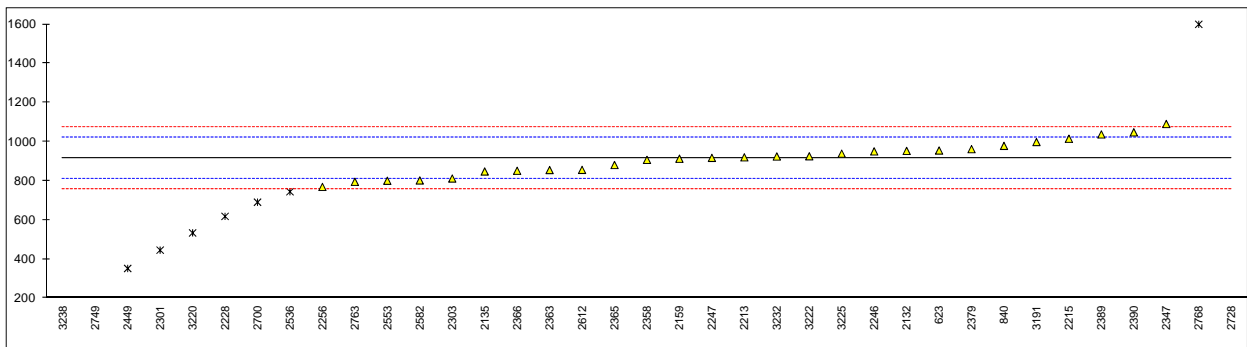
|      |            |         |         |        |      |            |            |           |
|------|------------|---------|---------|--------|------|------------|------------|-----------|
| 2741 |            | ----    |         | ----   | 3182 |            |            | ----      |
| 2749 | ISO14184-2 | 108.4   | R(0.01) | -15.38 | 3186 |            |            | ----      |
| 2755 |            | ----    |         | ----   | 3190 |            |            | ----      |
| 2759 |            | ----    |         | ----   | 3191 | ISO14184-2 | 998.3207 C | 1.59      |
| 2761 |            | ----    |         | ----   | 3195 |            |            | ----      |
| 2763 | ISO14184-2 | 795     |         | -2.29  | 3197 |            |            | ----      |
| 2766 |            | ----    |         | ----   | 3200 |            |            | ----      |
| 2767 |            | ----    |         | ----   | 3207 |            |            | ----      |
| 2768 | ISO14184-2 | 1599.95 | R(0.01) | 13.06  | 3210 |            |            | ----      |
| 3110 |            | ----    |         | ----   | 3212 |            |            | ----      |
| 3116 |            | ----    |         | ----   | 3214 |            |            | ----      |
| 3117 |            | ----    |         | ----   | 3220 | ISO14184-2 | 533.8      | ex -7.27  |
| 3118 |            | ----    |         | ----   | 3222 | ISO14184-2 | 925.69     | 0.20      |
| 3146 |            | ----    |         | ----   | 3225 | ISO14184-2 | 938.91     | 0.46      |
| 3149 |            | ----    |         | ----   | 3228 |            |            | ----      |
| 3150 |            | ----    |         | ----   | 3232 | ISO14184-2 | 924.5      | 0.18      |
| 3153 |            | ----    |         | ----   | 3237 |            |            | ----      |
| 3154 |            | ----    |         | ----   | 3238 | In house   | 10.21      | ex -17.25 |
| 3167 |            | ----    |         | ----   | 3248 |            |            | ----      |
| 3172 |            | ----    |         | ----   | 8005 |            |            | ----      |
| 3176 |            | ----    |         | ----   | 8008 |            |            | ----      |

normality OK  
n 27  
outliers 4 (+6ex)  
mean (n) 914.991  
st.dev. (n) 83.3973 RSD = 9%  
R(calc.) 233.512  
R(Horwitz) 146.878

Compare estimated R (ISO14184-2:11) = 80.3

Lab 3191 first reported: 165.0888

Test result of lab 2449 was excluded as ISO14184-1 was performed, which determines Free Formaldehyde and not released.  
Test result of lab 2228, 2536, 2700, 3220 and 3238 were excluded as a higher temperature than 40°C was used for the development of the color (see §4).



## APPENDIX 2

| labnrs | ISO/IEC17025 accredited? | Acetylacetone preparation time to test | Released Formald.: Intake of sample in grams | Released Formald.: volume of water in mls | Released Formald.: temp. and time for colour to develop |
|--------|--------------------------|--|--|---|---|
| 213    | Yes                      | ONE HOUR                               |  |   |   |
| 230    | ---                      |  |  |   |   |
| 348    | Yes                      | 4 days maximum                         |  |   |   |
| 362    | Yes                      | 24 h                                   |  |   |   |
| 551    | Yes                      | 12h                                    | 1,25 g                                       |   | 30 min / 40°C   |
| 622    | Yes                      | fresh before use                       |  |   | 40°C, 30 minute   |
| 623    | Yes                      | Freshly prepared                       | 1 g  |   | 40 C for 30 mins  |
| 840    | Yes                      | 12h                                    | 1g   |   | 40oC, 30 minutes  |
| 1132   | Yes                      | -                                      |  |   |   |
| 2102   | ---                      |  |  |   |   |
| 2115   | Yes                      | immediately before                     |  |   |   |
| 2129   | Yes                      | same day                               | 1 g  |   | 40°C  |
| 2132   | Yes                      | 12 hr before use                       | #16630 - 1 g;<br>#16631 - 1 g                |   | 40C for 30 min  |
| 2135   | Yes                      | 2 days                                 | 0,8  |   | 40°C 30min  |
| 2138   | Yes                      | within 24 hours                        |  |   |   |
| 2139   | Yes                      | 12 hours                               |  |   |   |
| 2146   | Yes                      | One day before                         | 16630: 1,3 g and<br>16631: 0,8 g             |   | 30 minutes in 40 °C                                     |
| 2159   | Yes                      | 30 minutes                             | 1 gram                                       |   | at 40 °C for 30 minutes                                 |
| 2165   | Yes                      | 24 hours                               | NA   |   | NA  |
| 2170   | Yes                      | a day before use.                      |  |   |   |
| 2172   | Yes                      | The same day                           |  |   |   |
| 2182   | Yes                      | 24-48 hours before                     |  |   |   |
| 2184   | Yes                      | 1 day                                  |  |   |   |
| 2190   | No                       | the day analysis                       | 2.5g for #16630<br>1g for #16631             |   | 40°C  |
| 2201   | No                       | >12h                                   | N/A  |   | N/A   |
| 2212   | Yes                      | One day before use                     |  |   |   |
| 2213   | Yes                      | 1 Week                                 | 0.5 g  |   | 40 °C temp and 30 min                                   |
| 2215   | Yes                      | 15 hours                               |  |   | 40°C 30min  |
| 2216   | Yes                      | 4 Weeks and 4 Days before analysis     | 1.0115 (16630)<br>1.0025 (16631)             |   | 40°C+/-2°C  |
| 2225   | Yes                      | over 12 hours                          |  |   |   |
| 2226   | Yes                      | 24 hrs before use                      |  |   |   |
| 2228   | Yes                      | 12 hours before use                    | 1.0004 g                                     |   | 58±1°C and 6 min  |
| 2236   | Yes                      | 2 weeks prior to use                   |  |   |   |
| 2238   | Yes                      | about 20 hours                         | One 1.0024g ,another<br>0.9994g              |   | 40°C,30min  |
| 2241   | Yes                      | 12h                                    |  |   |   |
| 2245   | Yes                      | Three days                             |  |   |   |
| 2246   | Yes                      | 12 hours before use                    | 1g   |   | 40°Cfor 30 minutes                                      |
| 2247   | Yes                      | 7 days                                 | 0.5257 g                                     |   | 30 mins at 40   |
| 2254   | Yes                      | 18 hours                               |  |   |   |
| 2255   | Yes                      | 12 hrs                                 |  |   |   |
| 2256   | Yes                      | 24 Hours                               | 0.5 gram                                     |   | 40°C for 30 min   |
| 2269   | Yes                      |  |  |   |   |
| 2275   | Yes                      |  |  |   |   |
| 2277   | Yes                      |  |  |   |   |
| 2279   | Yes                      | more than 12 hours                     |  |   |   |
| 2280   | Yes                      | two days                               |  |   |   |
| 2282   | Yes                      | About 15 to 18 hours                   |  |   |   |
| 2289   | Yes                      | 5days.                                 |  |   |   |

| labnrs | ISO/IEC17025 accredited? | Acetylacetone preparation time to test | Released Formald.: Intake of sample in grams | Released Formald.: volume of water in mls | Released Formald.: temp. and time for colour to develop |
|--------|--------------------------|--|--|---|---|
| 2290   | ---                      |  |  |   |   |
| 2293   | No                       | in the same day                        |  |   |   |
| 2294   | Yes                      | 24 hours before the test               |  |   |   |
| 2295   | Yes                      | 12 hours                               |  |   |   |
| 2296   | ---                      |  |  |   |   |
| 2298   | Yes                      | One week                               |  |   |   |
| 2301   | Yes                      | 1 day                                  | 1 gram                                       |   | 40 °C and 30 min  |
| 2303   | No                       | Two weeks                              | #16630 - 0.5168g,<br>#16631 - 0.4192g        |   | 40 °C for 30 min  |
| 2310   | Yes                      | 2 days                                 |  |   |   |
| 2311   | Yes                      | 3days                                  |  |   |   |
| 2313   | Yes                      | one day before                         |  |   |   |
| 2314   | Yes                      | One month                              |  |   |   |
| 2330   | Yes                      | 12hrs                                  | -  |   | -   |
| 2347   | Yes                      | 24hrs                                  | 0.5 gram                                     |   | 40°C:30 minutes   |
| 2348   | Yes                      | 36H                                    |  |   |   |
| 2351   | Yes                      | after 12hours                          |  |   |   |
| 2356   | Yes                      | One week                               | NA   |   | NA  |
| 2358   | Yes                      | 12 hours                               | 1 g  |   | 40°C for 30 minutes                                     |
| 2360   | Yes                      | 24 hour above                          | /  |   | /   |
| 2363   | Yes                      | 12h                                    | 0.5g   |   | at 40°C for 30 min                                      |
| 2364   | Yes                      | 12hours                                |  |   |   |
| 2365   | Yes                      | 12 hours                               | 0.5grams                                     |   | 40°C 30mins   |
| 2366   | Yes                      | 20jÄ0.25H                              | 0.5g   |   | 40°C,30min  |
| 2367   | Yes                      | 8 days                                 |  |   |   |
| 2368   | Yes                      |  |  |   |   |
| 2370   | Yes                      | 12hr                                   |  |   |   |
| 2373   | Yes                      | 4days                                  |  |   |   |
| 2375   | Yes                      | before 12 hours                        | 0.5020 g                                     |   | 49 C - 20 hours   |
| 2379   | No                       | 12 hour                                | 0.5g   |   | 40 +/- 2°C, 30 minute                                   |
| 2380   | Yes                      | 12 Hours                               | N/A  |   | N/A   |
| 2381   | Yes                      | 2 DAYS AGO                             | N/A  |   | N/A   |
| 2383   | Yes                      | 12h                                    | 1g   |   | 40°C,30min  |
| 2385   | Yes                      | 1 week                                 |  |   | 40 °C; 30 minutes                                       |
| 2389   | Yes                      | 07 days                                | 1 gram                                       |   | 40°C , for 30 minutes                                   |
| 2390   | Yes                      | 3 days before                          | 1.0 g  |   | 40C and 30 minutes                                      |
| 2401   | Yes                      |  |  |   |   |
| 2403   | Yes                      | 2 days                                 | /  |   | /   |
| 2404   | Yes                      | One day.                               |  |   |   |
| 2423   | No                       | same day                               |  |   |   |
| 2426   | Yes                      | Before 02 days of test                 |  |   |   |
| 2429   | Yes                      | 5 days                                 |  |   |   |
| 2432   | No                       | 12h                                    |  |   |   |
| 2433   | Yes                      | 12 hours                               |  |   |   |
| 2439   | Yes                      | 24 hours                               |  |   | 40°C and 30 minutes                                     |
| 2442   | Yes                      | 3 Days                                 |  |   |   |
| 2446   | No                       | 1 h before                             |  |   |   |
| 2449   | Yes                      | one week                               | 1.007 gram                                   |   | 40°C : 30 minutes                                       |
| 2453   | Yes                      | 5 DAYS                                 | 1.5g   |   | 40°C/30 min   |
| 2454   | Yes                      | held for 12h before use                |  |   |   |
| 2456   | Yes                      | twelve days before                     |  |   |   |
| 2462   | Yes                      | 24 hours                               |  |   |   |
| 2467   | No                       | 7 days                                 |  |   |   |

| labnrs | ISO/IEC17025 accredited? | Acetylacetone preparation time to test | Released Formald.: Intake of sample in grams   | Released Formald.: volume of water in mls | Released Formald.: temp. and time for colour to develop |
|--------|--------------------------|--|--|---|---|
| 2468   | Yes                      | 3 weeks                                | N/A  |   | N/A   |
| 2474   | Yes                      | 24 hours before use.                   |  |   |   |
| 2475   | Yes                      | Min 12H                                |  |   |   |
| 2476   | Yes                      | 24 hours                               |  |   |   |
| 2481   | No                       | One our before use                     |  |   |   |
| 2483   | Yes                      |  |  |   |   |
| 2489   | Yes                      | 6 weeks                                |  |   |   |
| 2495   | Yes                      | 1 day before                           |  |   |   |
| 2497   | Yes                      | one week                               |  |   |   |
| 2506   | Yes                      | 2 Weeks                                | 1.0091g & 1.0088g                              |   | 50°C for 20 hrs   |
| 2511   | Yes                      |  |  |   |   |
| 2514   | Yes                      | 12 hours                               |  |   |   |
| 2517   | ---                      |  |  |   |   |
| 2519   | No                       | on the day.                            | 1.0 g  |   | 40°C 30min  |
| 2520   | ---                      |  |  |   |   |
| 2527   | Yes                      | 3 days later                           |  |   |   |
| 2532   | Yes                      | 24 hrs                                 | -  |   | -   |
| 2534   | Yes                      | 7 days                                 |  |   |   |
| 2536   | Yes                      | 24 hrs                                 | For 16630 (0.5001 g) &<br>For 16631 (1.0010 g) |   | 58 (°C) & 6 (minutes)                                   |
| 2546   | Yes                      | 12 h                                   | 1g   |   | 40°C 40 minutes   |
| 2553   | Yes                      | 12 days                                | 1.0039 g                                       |   | 40 °C for 30 min.                                       |
| 2561   | Yes                      |  |  |   |   |
| 2563   | Yes                      | one day before use                     |  |   |   |
| 2567   | Yes                      | more than 12 hours                     | #16630: 0.6067 grams ;<br>#16631: 0.5121 grams |   | NC  |
| 2569   | ---                      |  |  |   |   |
| 2572   | Yes                      | 24 hours                               |  |   |   |
| 2582   | Yes                      | 5 days                                 | 0.8043   |   | (40 ± 2)°C,(30 ± 5) min.                                |
| 2589   | Yes                      |  |  |   |   |
| 2590   | Yes                      | just before use                        |  |   |   |
| 2591   | Yes                      | 2 days                                 |  |   |   |
| 2596   | No                       |  |  |   |   |
| 2598   | Yes                      | before one week ago.                   | It was 1.004 gram.                             |   | 40°Cfor 30 min  |
| 2606   | Yes                      | 1 Day                                  |  |   |   |
| 2612   | Yes                      | 10 days                                | 0,5g   |   | 40 °C for 15 min  |
| 2614   | Yes                      | 4 weeks                                |  |   |   |
| 2615   | Yes                      | Around one week                        | /  |   | /   |
| 2625   | Yes                      | 6 weeks                                |  |   | 40C, 30 minutes   |
| 2629   | Yes                      | 24 hours                               | 1.0 gram                                       |   | 65°C in 4 hours   |
| 2638   | No                       | 2 days before                          |  |   |   |
| 2644   | Yes                      | 30 minutes                             |  |   |   |
| 2646   | Yes                      | on day of analysis                     |  |   |   |
| 2667   | ---                      |  |  | 50 ml                                     |   |
| 2670   | Yes                      | eight days                             |  |   |   |
| 2674   | Yes                      | 24h                                    |  | 50 ml                                     |   |
| 2678   | Yes                      | One day                                | 1 gram   | 1L  | 40°C 30 minutes   |
| 2685   | No                       | 4 days                                 |  |   |   |
| 2689   | Yes                      | 24 hours                               |  |   |   |
| 2700   | Yes                      | At least 12 hours                      | 1.0 gram                                       |   | 65°C, 4hours  |
| 2702   | No                       | 2 Days                                 |  | 100 ml                                    |   |
| 2719   | Yes                      |  |  | #16630 - 50 ml; #16631<br>- 50 ml         |   |
| 2728   | Yes                      | 20 hours                               | 1 gram   | 50  | 49°C, 20 hours  |

| labnrs | ISO/IEC17025 accredited? | Acetylacetone preparation time to test                          | Released Formald.: Intake of sample in grams | Released Formald.: volume of water in mls | Released Formald.: temp. and time for colour to develop |
|--------|--------------------------|---|--|---|---|
| 2730   | No                       | 48 hours before used  |  |   |   |
| 2741   | Yes                      | Held for 12hrs  | /  |   | /   |
| 2749   | Yes                      | six months  | 0.5 and 1.0 g                                | 100 ml                                    | 40°C  |
| 2755   | Yes                      | 1 day   | 1 gram                                       | 50 ml                                     | 40°C  |
| 2759   | Yes                      | 2 days  |  | NA  |   |
| 2761   | Yes                      | 3 days  |  |   |   |
| 2763   | Yes                      | 12 Hours  | 0.5394 gm                                    |   | 40°C and 30 minutes                                     |
| 2766   | No                       | Two days  |  |   |   |
| 2767   | No                       | 1 day   |  |   |   |
| 2768   | ---                      |   |  | 100 ml                                    |   |
| 3110   | Yes                      |   |  | N/A                                       |   |
| 3116   | Yes                      | 4 days  |  |   |   |
| 3117   | Yes                      | Not less than 12 hours.   |  | 25 ml                                     |   |
| 3118   | Yes                      | 1 day before  |  | 50ml                                      |   |
| 3146   | Yes                      | 12 h  |  | 100mL                                     |   |
| 3149   | Yes                      | 3 days  | 0,5 g  |   |   |
| 3150   | Yes                      | 24 h  |  |   |   |
| 3153   | Yes                      | at least 12 hours   | NA   | 50 ml of water into a jar                 | NA  |
| 3154   | Yes                      |   |  |   |   |
| 3167   | Yes                      | 24h   |  | 50ml                                      |   |
| 3172   | Yes                      |   |  |   |   |
| 3176   | Yes                      | 2 days  | 0,78 g                                       |   | 40C, 30 min.  |
| 3182   | Yes                      | 24 hours  |  | 50mL                                      |   |
| 3186   | Yes                      |   |  | 50 ml                                     |   |
| 3190   | No                       | 6 weeks   | 1g   |   | 49°C 20h  |
| 3191   | Yes                      | Free form.18h;<br>Released form.:34h                            | #16630:0.5194 gram;<br>#16631:0.2686 gram    |   | 40°C, 30min   |
| 3195   | Yes                      | 24 hour   | /  | 25 mL                                     | /   |
| 3197   | Yes                      | 17 hours  |  |   |   |
| 3200   | Yes                      | The day before test   | 1g   |   |   |
| 3207   | Yes                      | Within 1 week   | 1 gram                                       |   |   |
| 3210   | Yes                      | 2 mois  |  |   |   |
| 3212   | Yes                      | 1 day   |  |   |   |
| 3214   | Yes                      |   |  |   |   |
| 3220   | Yes                      | Prepared on 2/11/2016<br>and test was conducted<br>on 3/11/2016 | 5ml  |   | 58°C for 6 minutes                                      |
| 3222   | Yes                      | 2 week  | 0.5 g  |   | 40°C, 30 min  |
| 3225   | Yes                      | 24 hours  | ~0.5g/per sample                             |   | 50°C, 1200minutes                                       |
| 3228   | Yes                      | > 12hours   | NA   |   | NA  |
| 3232   | Yes                      | Fresh   | 0.5 g  |   |   |
| 3237   | Yes                      | Same day  |  |   |   |
| 3238   | No                       | instantly   | 1,7268 g                                     |   | 60°C - 10 mn  |
| 3248   | Yes                      | 12 hours  | 1g   | 50 mL                                     | 40°C 30mins   |
| 8005   | Yes                      | 4 days  |  | 50ml                                      |   |
| 8008   | Yes                      |   |  |   |   |

**APPENDIX 3****Number of participants per country**

8 labs in BANGLADESH  
1 lab in BELGIUM  
1 lab in BRAZIL  
1 lab in BULGARIA  
1 lab in CAMBODIA  
1 lab in CAMBODIA, Kingdom of  
1 lab in CROATIA  
2 labs in EGYPT  
1 lab in FINLAND  
6 labs in FRANCE  
11 labs in GERMANY  
1 lab in GUATEMALA  
14 labs in HONG KONG  
15 labs in INDIA  
6 labs in INDONESIA  
10 labs in ITALY  
5 labs in KOREA  
1 lab in LITHUANIA  
2 labs in MAURITIUS  
4 labs in MEXICO  
1 lab in MOROCCO  
49 labs in P.R. of CHINA  
5 labs in PAKISTAN  
1 lab in PHILIPPINES  
1 lab in PORTUGAL  
1 lab in ROMANIA  
1 lab in SERBIA  
1 lab in SINGAPORE  
1 lab in SLOVENIA  
3 labs in SPAIN  
2 labs in SRI LANKA  
1 lab in SWITZERLAND  
4 labs in TAIWAN R.O.C.  
4 labs in THAILAND  
1 lab in THE NETHERLANDS  
2 labs in TUNISIA  
7 labs in TURKEY  
1 lab in U.A.E.  
4 labs in U.S.A.  
4 labs in UNITED KINGDOM  
9 labs in VIETNAM



## APPENDIX 4

### Abbreviations:

|          |  |
|----------|--|
| C        | = final result after checking of first reported suspect result |
| D(0.01)  | = outlier in Dixon's outlier test                              |
| D(0.05)  | = straggler in Dixon's outlier test                            |
| G(0.01)  | = outlier in Grubbs' outlier test                              |
| G(0.05)  | = straggler in Grubbs' outlier test                            |
| DG(0.01) | = outlier in Double Grubbs' outlier test                       |
| DG(0.05) | = straggler in Double Grubbs' outlier test                     |
| R(0.01)  | = outlier in Rosner outlier test                               |
| R(0.05)  | = straggler in Rosner outlier test                             |
| n.a.     | = not applicable   |
| n.d.     | = not detected   |
| W        | = withdrawn  |

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