Results of Proficiency Test
OPP, PCP and TeCP in textile
November 2012

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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Report: iis12A06

March 2013

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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, some Eco-labelling schemes are imposing environmental requirements for textile products on a voluntary basis, e.g. Milieukeur (Netherlands) and Öko-Tex Standard 100 (Germany).
The Institute for Interlaboratory Studies organizes since 2004 a scheme of proficiency test for Orthophenylphenol (OPP), Pentachlorophenol (PCP) and Tetrachlorophenols (TeCP) in textile. In the annual proficiency test program of 2012/2013, this proficiency test was continued.
In these interlaboratory study 92 laboratories in 19 different countries participated. See appendix 3 for the number of participants per country. In this report, the results of the 2012 proficiency test are presented and discussed.

2 SET UP

The Institute for Interlaboratory Studies in Spijkenisse was the organiser of the proficiency test. It was decided to use two different samples spiked with OPP and PCP. A third party laboratory prepared the samples and another (accredited) third party laboratory was subcontracted to perform the homogeneity tests. Participants were requested to report results with one extra figure. These results with an extra figure are preferably used for statistical evaluation.

2.1 QUALITY SYSTEM

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, has implemented a quality system based on ISO guide 43, ILAC-G13:2007 and IEC/ISO17043:2010. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentially 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 January 2010 (iis-protocol, version 3.2).

2.3 CONFIDENTIALITY STATEMENT

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

or more of the participating companies will be done only after receipt of a written agreement of the companies involved.

2.4 SAMPLES

Two batches of textile were obtained from a third party laboratory. The first bulk sample, a hosiery fabric was cut into pieces. The pieces were well mixed and divided over 123 subsamples of 5 grams each and labelled #12162. The second bulk sample, another hosiery fabric was also cut into pieces. The pieces were well mixed and divided over 125 subsamples of 5 grams each and subsequently labelled #12163.
The homogeneities of randomly selected samples #12162 and #12163 were checked by determination of OPP and PCP by an accredited third party laboratory. The determination is performed in accordance with an in-house test method for OPP and in accordance with LFGB 82.02.8 for PCP. See the following table for the test results.

	OPP in mg/kg	*PCP in mg/kg*
Sample #12162-1	14.6	9.7
Sample #12162-2	15.0	10.1
Sample #12162-3	15.6	10.4
Sample #12162-4	15.3	9.7

Table 1: homogeneity test results of subsample #12162

	OPP in mg/kg	*PCP in mg/kg*
Sample #12163-1	22.3	24.8
Sample #12163-2	23.1	24.3
Sample #12163-3	22.8	24.2
Sample #12163-4	22.9	24.2

Table 2: homogeneity test results of subsample #12163

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

	OPP in mg/kg	*PCP in mg/kg*
r (samples #12162)	1.3	1.0
Reference method	Horwitz	LFGB 82.02.8
0.3 x R (reference method)	1.4	1.1

Table 3: repeatabilities of subsamples #12162.

	OPP in mg/kg	*PCP in mg/kg*
r (samples #12163)	0.9	0.8
Reference method	Horwitz	LFGB 82.02.8
0.3 x R (reference method)	1.9	2.6

Table 4: repeatabilities of subsamples #12163

The repeatabilities of Pentachlorophenol (PCP) and Orthophenylphenol (OPP) were in agreement with 0.3 times the target requirements. Therefore, homogeneity of the subsamples was assumed.
In total one sample of approx. 5 grams of sample #12162 and one sample of approx. 5 grams of sample #12163 was sent to the participating laboratories on November 7, 2012.

2.5 ANALYSES

The participants were asked to determine the concentrations of Orthophenylphenol (OPP), Pentachlorophenol (PCP), 2,3,4,5-Tetrachlorophenol, 2,3,4,6-Tetrachlorophenol and 2,3,5,6-Tetrachlorophenol applying the analysis procedure that is routinely used in the laboratory. To get comparable results a detailed report form, was sent together with each set of samples. On the report forms the requested phenols including the units and questions about the analytical details were printed. In addition, a letter of instructions was sent along.

3 RESULTS

During four weeks after sample despatch, the results of the individual laboratories were gathered. The original data are tabulated in the appendices of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder fax was sent to those laboratories that had not yet reported. Shortly after the deadline, the available results were screened for suspect data. A result was called suspect in case the Huber Elimination Rule (a robust outlier test, see lit.5) found it to be an outlier. The laboratories that produced these suspect data were asked to check the results. Additional or corrected data are placed under 'Remarks' in the result tables in appendix 1. A list of abbreviations used in the tables can be found in appendix 4.

3.1 STATISTICS

Statistical calculations were performed as described in the report ’iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of January 2010 (iis-protocol, version 3.2)
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded results. Results reported as ‘<…’ or ‘>…” were not used in the statistical evaluation.
Before further calculations, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test. In the case of an anormal distribution, the statistical evaluation should be used with care.
According to ISO 5725 (1986 and 1994, lit.7 and 8) the original results per determination were submitted subsequently to Dixon’s and Grubbs' 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. Stragglers are marked by D(0.05) for the Dixon’s test, by G(0.05) or DG(0.05) for the Grubbs’ test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. 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 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 visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported analysis results are plotted. The corresponding laboratory numbers are under 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. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms (see appendix 4, nos.14-15).

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ISO reproducibilities, 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 literature reproducibility by division with 2.8. The z-scores were calculated in accordance with:

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

When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used, this in order to evaluate the fit-for-useness of the reported test result.
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 serious problems occurred. In total 88 of the 92 participants reported 553 numerical results. Observed in all reported results were 38 statistical outlying results, which is 6.9%. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal. Not all original data sets proved to have a normal distribution. A normal distributions were found for OPP in both samples. For these determinations the results of the statistical evaluation should be used with due care.

4.1 EVALUATION PER DETERMINATION

Due to the lack of relevant standard test methods for the determination of OPP, the calculated reproducibilities were compared with the reproducibilities estimated from the Horwitz equation. For PCP, both existing methods (LFGB 82.02-8 and ISO17070:2006, the latter method superseding DIN53313:1996 and DIN14494:2003), mention the same reproducibility values for leather only. Both methods are also applicable for isomers of Tri- and Tetrachlorophenols, but as no reproducibilities for these compounds are mentioned, again estimates from the Horwitz equation were used as target reproducibilities.
All reported results from six laboratories were excluded from the statistical evaluation, as these laboratories reported two or more outliers for PCP and 2,3,4,6-TeCP (one lab was only for OPP excluded). As the four test results are not independent, it was decided not to use any of the eight test results for the statistical evaluation.

OPP: The determination of this component may be problematic at the levels of 5.9 and 11.6 mg/kg. In total nine statistical outliers were detected and the calculated reproducibilities, after rejection of the statistical outliers, are for both samples not at all in agreement with the strict reproducibilities calculated using the Horwitz equation.

PCP: The determination of this component was problematic at the levels of 8.9 and 21.3 mg/kg. In total twelve statistical outliers were detected and the calculated reproducibilities, after rejection of the statistical outliers, are not in agreement with the requirements of LFGB 82.02.8

2,3,4,5-TeCP: Both samples (#12162 and #12163) did contain very little of this component (respectively 0.05 and 0.11 mg/kg), which is near or below the detection limit. Therefore no significant conclusions were drawn.

2,3,4,6-TeCP: The determination of this component may be problematic at a concentration level of 0.36 and 1.06 mg/kg. In total 8 statistical outliers were detected. The calculated reproducibilities after rejection of the statistical outliers are both not in agreement with the estimated reproducibility calculated using the Horwitz equation.

2,3,5,6-TeCP: Both samples (#12162 and #12163) did contain very little of this component (respectively 0.09 and 0.15 mg/kg), which is near or below the detection limit. Therefore no significant conclusions were drawn.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the estimated target reproducibilities (see 4.1) 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 are compared in the next table:

	unit	*n*	*Average*	*2.8 * sd*	*R (target)*
OPP	mg/kg	71	5.93	4.73	2.03
PCP	mg/kg	80	8.92	5.81	3.12
2,3,4,5-TeCP	mg/kg	14	0.05	unknown	unknown
2,3,4,6-TeCP	mg/kg	61	0.36	0.28	0.19
2,3,5,6-TeCP	mg/kg	14	0.09	unknown	unknown

Table 5: reproducibilities of phenols on textile sample #12162

	unit	*n*	*average*	*2.8 * sd*	*R (target)*
OPP	mg/kg	71	11.61	9.44	3.60
PCP	mg/kg	80	21.31	9.58	7.46
2,3,4,5-TeCP	mg/kg	22	0.11	unknown	unknown
2,3,4,6-TeCP	mg/kg	70	1.06	0.57	0.47
2,3,5,6-TeCP	mg/kg	19	0.15	unknown	unknown

Table 6: reproducibilities of phenols on textile sample #12163

Without further statistical calculations, it can be concluded that for OPP and PCP, the total group of participating laboratories has difficulties with the analysis. See also the discussion in paragraphs 4.1 and 6.

5 COMPARISON WITH PREVIOUS INTERLABORATORY STUDIES

The spreads, found during the present proficiency test when using all reported results, are similar to the spreads as observed in the previous rounds.

	November 2012	*November 2011*	*December 2010*	*February 2010*	*February 2009*
OPP	80 - 81%	60 – 68%	47 - 88%	47 - 53%	82 – 98%
PCP	45 - 65%	53 – 55%	41 - 66%	51 - 55%	82 – 88%

Table 7: Comparison of relative standard deviations (RSDs) in iis proficiency tests

6 DISCUSSION

In this proficiency test for the determination of phenols in textile, it was noticed that the majority of the participants detected OPP, PCP and 2,3,4,6-TeCP in both samples.

Many of the reported methods are in-house methods and the details of these methods vary widely (see appendix 2). The spreads observed in this interlaboratory study may be caused by the use of different release techniques.

When the results of this interlaboratory study were compared to the Ecolabelling Standards and Requirements for Textiles in EU (table 8), it could be noticed that for both samples on OPP none of the participants would make a different decision about the acceptability of the textiles, except laboratories 3176 and 3180 (both for sample #12163)
For the determination on PCP and Tetrachlorophenols almost all reporting laboratories would reject the samples for all 4 classes.
Many laboratories did report <0.1, <0.2, <0.5 or <1.0 mg/kg for one or more components, which is remarkable as these reported limits are above the lower limits of the OekoTex requirements of 0.05 mg/kg, see below table.

	Class 1 Baby clothes (mg/kg)	Class 2 Clothes direct skin contact (mg/kg)	Class 3 Clothes, no direct contact with skin (mg/kg)	Class 4 Decoration material (mg/kg)
Orthophenylphenol	50.0	100.0	100.0	100.0
Pentachlorophenol	0.05	0.5	0.5	0.5
Sum of Tetrachlorophenols	0.05	0.5	0.5	0.5

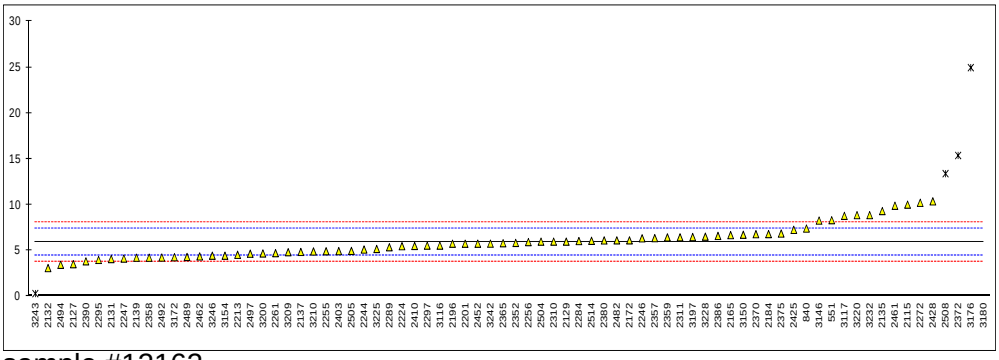
Table 8: Ecolabelling Standards and Requirements for Textiles in EU

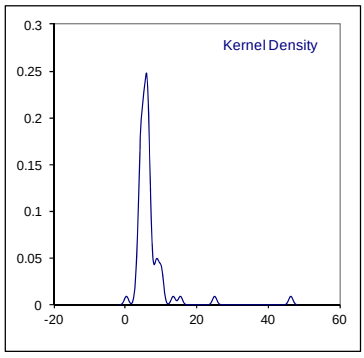
APPENDIX 1

Determination of Orthophenylphenol (OPP) on sample #12162 and #12163; results in mg/kg

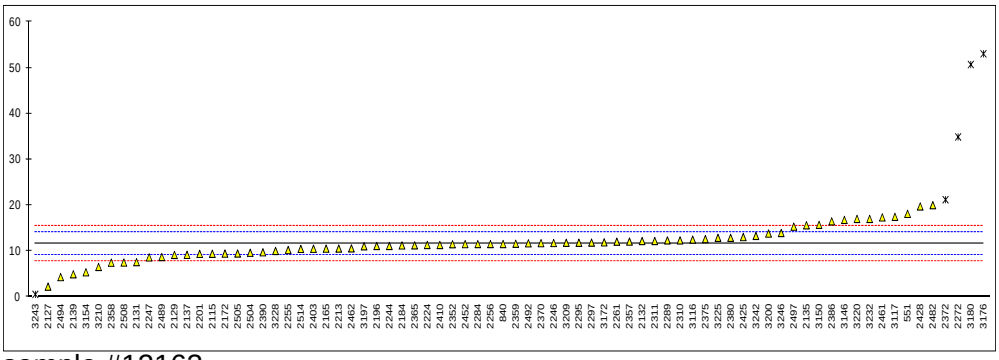
lab	method	#12162	mark	z(targ)	#12163	mark	z(targ)	Remarks
551	in house	8.3		3.28	18.1		5.05	
840	in house	7.39		2.02	11.51		-0.08	
2115	Oeko-Tex	10.00		5.62	9.375		-1.74	
2127	in house	3.5		-3.34	2.2		-7.33	
2129	ISO17070	5.961		0.05	9.126		-1.94	
2131	in house	4.06		-2.57	7.55		-3.16	
2132	in house	3.07		-3.94	12.16		0.43	
2135	in house	9.3		4.65	15.6		3.10	
2137	in house	4.8305		-1.51	9.1513		-1.92	
2139	in house	4.2		-2.38	4.9		-5.23	
2165	LFGB B82.02-8	6.67		1.03	10.5		-0.87	
2172		6.10		0.24	9.42		-1.71	
2184	LFGB B82.02-8	6.78		1.18	11.20		-0.32	
2196	ISO17070	5.73		-0.27	11.08		-0.42	
2201	ISO17070	5.73		-0.27	9.35		-1.76	
2213	LFGB B82.02-8	4.52		-1.94	10.52		-0.85	
2224	in house	5.46		-0.64	11.30		-0.24	
2244	GB/T20386	5.10		-1.14	11.08		-0.42	
2246	in house	6.321		0.55	11.726		0.09	
2247	LFGB 82.02-8	4.11		-2.50	8.59		-2.35	
2255	LFGB B82.02-8	4.91		-1.40	10.2		-1.10	
2256	LFGB B82.02-8	5.91		-0.02	11.5		-0.09	
2261	GB/T20386	4.70		-1.69	12.02		0.32	
2272	INH-8015	10.2	C	5.89	34.9	C,G(0.01)	18.13	First reported 12.8 and 43.6
2284	ISO17070	6.02		0.13	11.50		-0.09	
2289	ISO17070	5.35		-0.79	12.30		0.53	
2290		-----		-----	-----		-----	
2295	LMGB 82.02-8	3.96		-2.71	11.79		0.14	
2296		-----		-----	-----		-----	
2297		5.52		-0.56	11.82		0.16	
2300		-----		-----	-----		-----	
2310	in house	5.96		0.05	12.3		0.53	
2311	LFGB 82.02-8	6.43		0.70	12.17		0.43	
2352	in house	5.82		-0.14	11.46		-0.12	
2357	in house	6.34		0.57	12.04		0.33	
2358	in house	4.2036		-2.37	7.4339		-3.25	
2359	LFGB B82.02-8	6.42		0.68	11.57		-0.03	
2365	in house	5.789		-0.19	11.220		-0.31	
2370	in house	6.77		1.17	11.7		0.07	
2372	in house	15.369	G(0.01)	13.02	21.189	ex	7.45	See §4.1
2375	in house	6.842		1.26	12.592		0.76	
2379		-----		-----	-----		-----	
2380	in house	6.091		0.23	12.866		0.97	
2386	LFGB 82.02-8	6.58		0.90	16.46		3.77	
2390	LFGB B82.02-8	3.810		-2.92	9.700		-1.49	
2403	GB/T 18414.1	4.92		-1.39	10.47		-0.89	
2410	LFGB B82.02-8	5.49		-0.60	11.30		-0.24	
2425	LFGB B82.02-8	7.247		1.82	13.03		1.10	
2428	GB/T20386	10.36		6.12	19.72		6.31	
2452	INH-0815	5.737		-0.26	11.493		-0.09	
2461	GB/T20386	9.88		5.45	17.32	C	4.44	First reported 20.14
2462	LMBG 82.02-8	4.340		-2.19	10.56		-0.82	
2482	in house	6.10		0.24	20.0		6.53	
2488		-----		-----	-----		-----	
2489	LFGB 82.02-8	4.28		-2.27	8.67		-2.29	
2492	in house	4.222		-2.35	11.662		0.04	
2493		-----		-----	-----		-----	
2494	ISO17070	3.430		-3.44	4.280		-5.71	
2497	UNI11057	4.64	C	-1.77	15.3		2.87	First reported 61.75
2504	in house	5.96		0.05	9.59		-1.58	
2505	GB/T20386	4.948		-1.35	9.437		-1.69	
2508	DIN12673	13.38	G(0.01)	10.28	7.47		-3.23	
2514	LFGB B82.02-8	6.05		0.17	10.43		-0.92	
3100		-----		-----	-----		-----	
3104		-----		-----	-----		-----	
3116	LFGB 82.02-8	5.526		-0.55	12.48		0.67	
3117	GB/T18414.1	8.774		3.93	17.448		4.54	
3146	in house	8.26		3.22	16.78		4.02	
3150	in house	6.71		1.08	15.7		3.18	
3153		-----		-----	-----		-----	
3154	DIN13365	4.42		-2.07	5.34		-4.88	

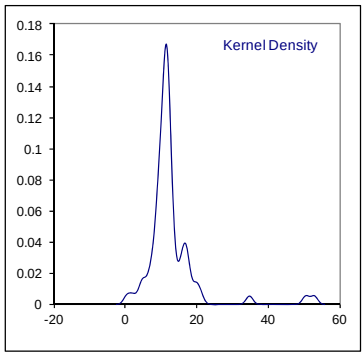
3172	in house	4.257		-2.30	11.877		0.20	
3176	in house	24.96	C,G(0.01)	26.25	53.06	C,G(0.01)	32.26	First reported 13.0 and 27.5
3180	in house	46.26	G(0.01)	55.62	50.71	G(0.01)	30.43	
3182		-----		-----	-----		-----	
3185		-----		-----	-----		-----	
3190		-----		-----	-----		-----	
3192		-----		-----	-----		-----	
3197	in house	6.46		0.74	11.02		-0.46	
3200	LFGB 82.02-8	4.67		-1.73	13.80		1.70	
3204		-----		-----	-----		-----	
3209	ISO17070	4.807		-1.54	11.779		0.13	
3210	in house	4.89		-1.43	6.5		-3.98	
3218		-----		-----	-----		-----	
3220	in house	8.85	C	4.03	17.0	C	4.19	First reported 4.45 and 2.0
3225		5.16		-1.05	12.86		0.97	
3228	LFGB B82.02-8	6.5		0.79	10.0		-1.26	
3232	ISO17070	8.85		4.03	17.0		4.19	
3237		-----		-----	-----		-----	
3242	in house	5.74		-0.25	13.28		1.30	
3243	in house	0.28	G(0.01)	-7.78	0.51	G(0.01)	-8.64	
3246	ISO17070	4.42		-2.07	13.91		1.79	
	normality	not OK			not OK			
	n	71			71			
	outliers	5			4			
	mean (n)	5.925			11.614			
	st.dev. (n)	1.6890			3.3698			
	R(calc.)	4.729			9.435			
	R(Horwitz)	2.031			3.597			





sample #12162



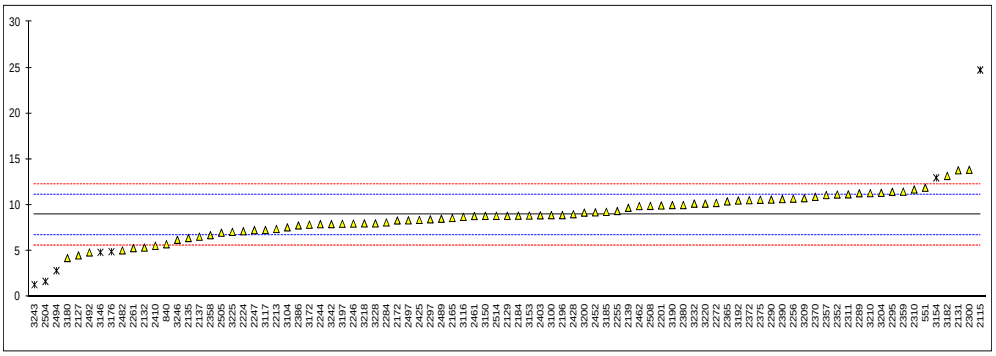


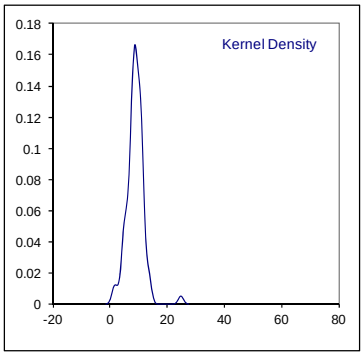
sample #12163

Determination of Pentachlorophenol (PCP) on sample #12162 and #12163; results in mg/kg

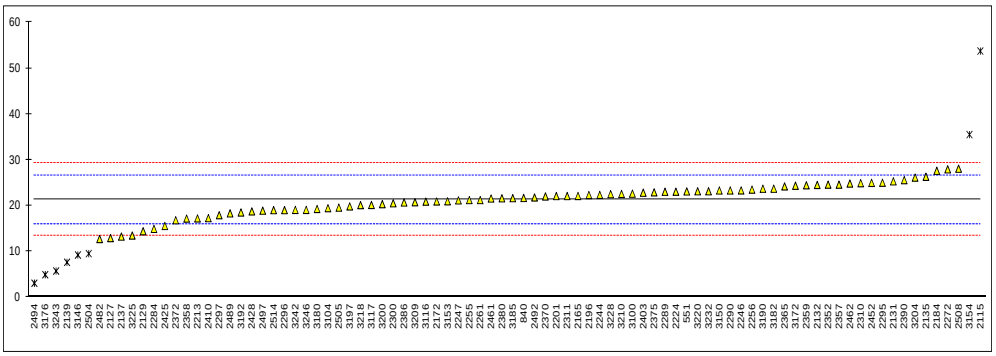
lab	method	#12162	mark	z(targ)	#12163	mark	z(targ)	Remarks
551	DIN53313	11.9		2.67	23.1		0.67	
840	in house	5.72		-2.87	21.66		0.13	
2115	Oeko-Tex	24.75	G(0.01)	14.19	53.75	G(0.01)	12.18	
2127	in house	4.5	C	-3.97	12.9	C	-3.16	First reported 3.1 and 6.3
2129	ISO17070	8.822		-0.09	14.403		-2.59	
2131	in house	13.8		4.37	25.3		1.50	
2132	in house	5.36		-3.19	24.51		1.20	
2135	in house	6.4		-2.26	26.3		1.87	
2137	in house	6.5498		-2.13	13.2247		-3.04	
2139	in house	9.7		0.70	7.6	DG(0.01)	-5.15	
2165	LFGB B82.02-8	8.59		-0.30	22.1		0.30	
2172		8.32		-0.54	20.9		-0.15	
2184	64LFGB B82.02-8	8.84		-0.07	27.60		2.36	
2196	ISO17070	8.90		-0.02	22.31		0.38	
2201	ISO17070	9.96		0.93	22.08		0.29	
2213	64LFGB B82.02-8	7.39		-1.37	17.201		-1.54	
2224	in house	7.14		-1.60	23.04		0.65	
2244	in house	7.91		-0.91	22.34		0.39	
2246	in house	7.976		-0.85	23.313		0.75	
2247	64LFGB 82.02-8	7.26		-1.49	21.14		-0.06	
2255	LFGB B82.02-8	9.35		0.38	21.2		-0.04	
2256	64LFGB B82.02-8	10.7		1.59	23.5		0.82	
2261	GB/T 18414.1	5.30		-3.25	21.20	C	-0.04	First reported 8.2
2272	INH-8015	10.23		1.17	27.92		2.48	
2284	ISO17070	8.10		-0.74	14.91		-2.40	
2289	ISO17070	11.29		2.12	23.02		0.64	
2290	64LFGB B82.02-8	10.60		1.50	23.30		0.75	
2295	35LMGB 82.02-8	11.45		2.27	25	C	1.39	First reported 33.69
2296	ISO17070	<1.0	False -?	<-7.10	19.01		-0.86	
2297		8.44		-0.43	17.9		-1.28	
2300	ISO17070	13.85		4.42	20.51		-0.30	
2310	LFGB	11.7		2.49	24.9		1.35	
2311	LFGB 82.02-8	11.17		2.01	22.08		0.29	
2352	64LFGB B82.02-8	11.15		2.00	24.58		1.23	
2357	64LFGB B82.02-8	11.09		1.94	24.58		1.23	
2358	DIN53313	6.7118		-1.98	17.1691		-1.55	
2359	ISO17070	11.46		2.28	24.44		1.18	
2365	64LFGB B82.02-8	10.405		1.33	24.193		1.08	
2370	LFGB B82.02-8	10.9		1.77	22.0		0.26	
2372	in house	10.529		1.44	16.801		-1.69	
2375	LFGB 82.02-8Mod	10.58		1.49	22.9		0.60	
2379		-----		-----	-----		-----	
2380	in house	10.003		0.97	21.588		0.10	
2386	LFGB 82.02-8	7.78		-1.02	20.68		-0.24	
2390	64LFGB B82.02-8	10.653		1.55	25.564		1.60	
2403	GB/T 18414.1	8.88		-0.04	22.82		0.57	
2410	LFGB B82.02-8	5.55		-3.02	17.25		-1.52	
2425	64LFGB B82.02-8	8.378		-0.49	15.54		-2.17	
2428	GB/T18414.1	9.00		0.07	18.74		-0.96	
2452	INH-0815	9.204		0.25	24.971		1.37	
2461	GB/T18414.1	8.80		-0.11	21.55		0.09	
2462	LMBG 82.02-8	9.890		0.87	24.82		1.32	
2482	in house	5.05		-3.47	12.7		-3.23	
2488		-----		-----	-----		-----	
2489	64LFGB 82.02-8	8.51		-0.37	18.30		-1.13	
2492	in house	4.826		-3.67	21.778		0.18	
2493		-----		-----	-----		-----	
2494	ISO17070	2.836	G(0.01)	-5.46	3.037	DG(0.05)	-6.86	
2497	UNI11057	8.33	C	-0.53	18.89		-0.91	First reported 19.8
2504	in house	1.66	G(0.01)	-6.51	9.49	G(0.05)	-4.44	
2505	GB/T18414.1	6.981		-1.74	19.558		-0.66	
2508	DIN12673	9.91		0.89	28.06		2.53	
2514	LFGB B82.02-8	8.82		-0.09	19.01		-0.86	
3100	ISO17070	8.90		-0.02	22.61		0.49	
3104	in house	7.57		-1.21	19.44		-0.70	
3116	LFGB 82.02-8	8.712		-0.19	20.87		-0.16	
3117	GB/T18414.1	7.278		-1.47	20.140		-0.44	
3146	in house	4.84	ex	-3.66	9.20	DG(0.01)	-4.55	See §4.1
3150	in house	8.82		-0.09	23.3		0.75	
3153	LFGB B82.02-8	8.85		-0.07	20.94		-0.14	
3154	ISO17070	12.97	C,ex	3.63	35.50	C,G(0.05)	5.33	First reported 16.6 and 51.8
3172	in house	7.860		-0.95	24.341		1.14	

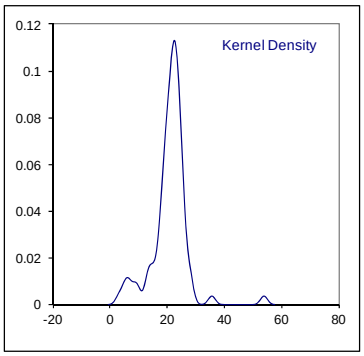
3176	35LMGB 82.02-8	4.91	ex	-3.60	4.9	C,DG(0.05)	-6.16	First reported 9.8, see §4.1
3180	LFGB B82-02-8	4.215		-4.22	19.26		-0.77	
3182	LFGB B82.02-8	13.185		3.82	23.696		0.90	
3185	ISO17070	9.26		0.30	21.62		0.12	
3190	LFGB B82.02-8	10.00		0.97	23.68		0.89	
3192	in house	10.5		1.41	18.5		-1.05	
3197	LFGB 82.02-8	7.96		-0.86	19.82		-0.56	
3200	LFGB 82.02-8	9.18		0.23	20.32		-0.37	
3204	in house	11.34		2.17	26.11		1.80	
3209	ISO17070	10.751		1.64	20.728		-0.22	
3210	INH-8015	11.3		2.13	22.55		0.47	
3218	64LFGB 82.02-8	8.00		-0.83	20.1		-0.45	
3220	in house	10.16	C	1.11	23.12	C	0.68	First reported 2.3 and 3.3
3225		7.07		-1.66	13.46		-2.95	
3228	LFGB B82.02-8	8.0		-0.83	22.5		0.45	
3232	ISO17070	10.16		1.11	23.12		0.68	
3237		-----		-----	-----		-----	
3242	in house	7.92		-0.90	19.06		-0.84	
3243	in house	1.3	G(0.01)	-6.83	5.7	DG(0.05)	-5.86	
3246	ISO17070	6.21		-2.43	19.06		-0.84	
	normality	OK			OK			
	n	80			80			
	outliers	4			8			
	mean (n)	8.923			21.309			
	st.dev. (n)	2.0756			3.4221			
	R(calc.)	5.812			9.582			
	R(LFBG82.02.8)	3.123			7.458			





Sample #12162



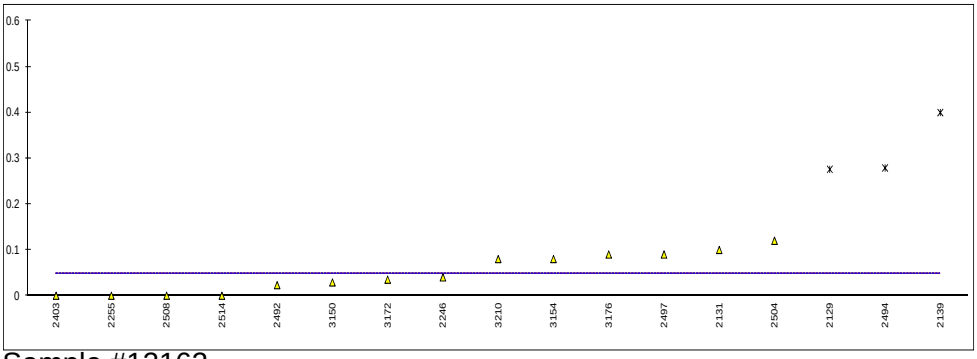


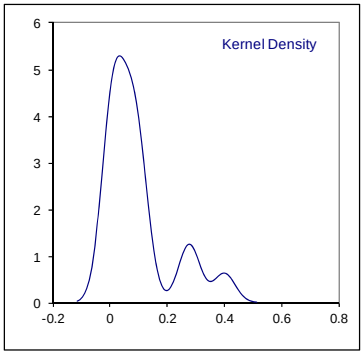
Sample #12163

Determination of 2,3,4,5-Tetrachlorophenol on sample #12162 and #12163; results in mg/kg

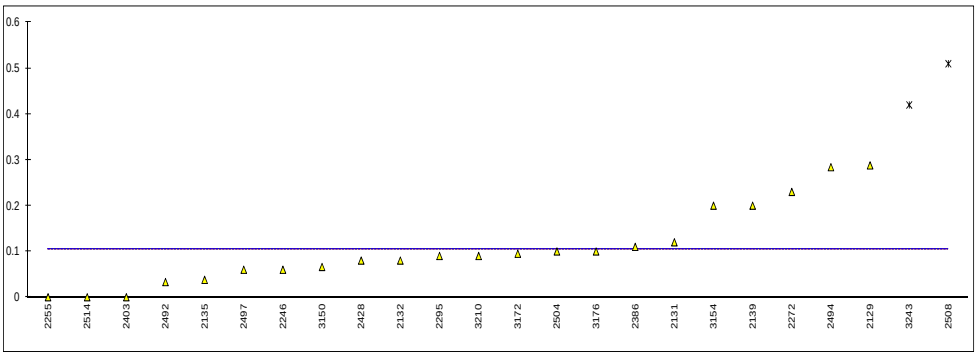
lab	method	#12162	mark	z(targ)	#12163	mark	z(targ)	Remarks
551		-----		-----	-----		-----	
840		-----		-----	n.d.		-----	
2115		-----		-----	-----		-----	
2127		-----		-----	-----		-----	
2129	ISO17070	0.276		-----	0.288		-----	First reported 0.
2131	in house	0.10		-----	0.12		-----	
2132	in house	<0.05		-----	0.08		-----	
2135		-----		-----	0.038		-----	
2137	in house	<0.1		-----	<0.1		-----	
2139	in house	0.4	G(0.05)	-----	0.2		-----	
2165	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2172		n.d.		-----	n.d.		-----	
2184	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2196	ISO17070	n.d.		-----	n.d.		-----	
2201	ISO17070	<0.5		-----	<0.5		-----	
2213	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2224	in house	n.d.		-----	n.d.		-----	
2244		-----		-----	-----		-----	
2246	in house	0.040		-----	0.060		-----	
2247		-----		-----	-----		-----	
2255	LFGB B82.02-8	0.0		-----	0.0		-----	
2256	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2261		-----		-----	-----		-----	
2272	INH-8015	n.d.		-----	0.23	C	-----	First reported 0.84
2284	ISO17070	<0.05		-----	<0.05		-----	
2289		-----		-----	-----		-----	
2290	LFGB B82.02-8	<0.20		-----	<0.20		-----	
2295	LMGB 82.02-8	n.d.		-----	0.09	C	-----	First reported nd
2296	ISO17070	<1.0		-----	<1.0		-----	
2297		<0.05		-----	<0.05		-----	
2300		-----		-----	-----		-----	
2310	LFGB	n.d.		-----	n.d.		-----	
2311	LFGB 82.02-8	n.d.		-----	n.d.		-----	
2352	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2357	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2358	DIN53313	<0.1		-----	<0.1		-----	
2359	ISO17070	n.d.		-----	n.d.		-----	
2365	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2370	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2372	in house	n.d.		-----	n.d.		-----	
2375	LFGB 82.02-8Mod	n.d.		-----	n.d.		-----	
2379		-----		-----	-----		-----	
2380	in house	n.d.		-----	n.d.		-----	
2386	LFGB 82.02-8	<0.1		-----	0.11		-----	
2390		-----		-----	-----		-----	
2403		0		-----	0		-----	
2410	LFGB B82.02-8	<0.5		-----	<0.5		-----	
2425	64LFGB B82.02-8	n.d.		-----	n.d.		-----	
2428	GB/T18414.1	n.d.		-----	0.08		-----	
2452		-----		-----	-----		-----	
2461		-----		-----	-----		-----	
2462	LMBG 82.02-8	n.d.		-----	n.d.		-----	
2482	in house	n.d.		-----	n.d.		-----	
2488		-----		-----	-----		-----	
2489		-----		-----	-----		-----	
2492	in house	0.023		-----	0.033		-----	
2493		-----		-----	-----		-----	
2494	ISO17070	0.279	G(0.01)	-----	0.284		-----	
2497	UNI11057	0.09		-----	0.06		-----	
2504	in house	0.12		-----	0.10		-----	
2505		-----		-----	-----		-----	
2508	DIN12673	0.0		-----	0.51	G(0.05)	-----	
2514	LFGB B82.02-8	0.0		-----	0.0		-----	
3100	ISO17070	n.d.		-----	n.d.		-----	
3104		-----		-----	-----		-----	
3116	LFGB 82.02-8	n.d.		-----	n.d.		-----	
3117		-----		-----	-----		-----	
3146	in house	<0.1		-----	<0.1		-----	
3150	in house	0.029		-----	0.066		-----	
3153		-----		-----	-----		-----	
3154	ISO17070	0.08		-----	0.20		-----	
3172	in house	0.035		-----	0.095		-----	

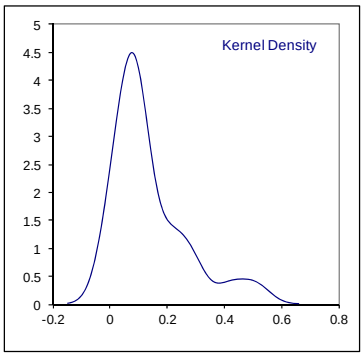
3176	35LMGB 82.02-8	0.09	-----	0.1	C	-----	First reported 0.5
3180		-----	-----	-----		-----	
3182		-----	-----	-----		-----	
3185	ISO17070	n.d.	-----	n.d.		-----	
3190		-----	-----	-----		-----	
3192		-----	-----	-----		-----	
3197	LFGB 82.02-8	<0.5	-----	<0.5		-----	
3200	LFGB 82.02-8	n.d.	-----	n.d.		-----	
3204	in house	n.d.	-----	n.d.		-----	
3209	ISO17070	n.d.	-----	n.d.		-----	
3210	INH-8015	0.08	-----	0.09		-----	
3218		-----	-----	-----		-----	
3220	in house	n.d.	-----	n.d.		-----	
3225		-----	-----	-----		-----	
3228	LFGB B82.02-8	n.d.	-----	n.d.		-----	
3232	ISO17070	<0.05	-----	<0.05		-----	
3237		-----	-----	-----		-----	
3242	in house	n.d.	-----	n.d.		-----	
3243		-----	-----	0.42	G(0.05)	-----	
3246	ISO17070	n.d.	-----	n.d.		-----	
	normality	n.a.		n.a.			
	n	14		22			
	outliers	3		2			
	mean (n)	0.049		0.106			
	st.dev. (n)	n.a.		n.a.			
	R(calc.)	n.a.		n.a.			
	R(lit)	n.a.		n.a.			





Sample #12162





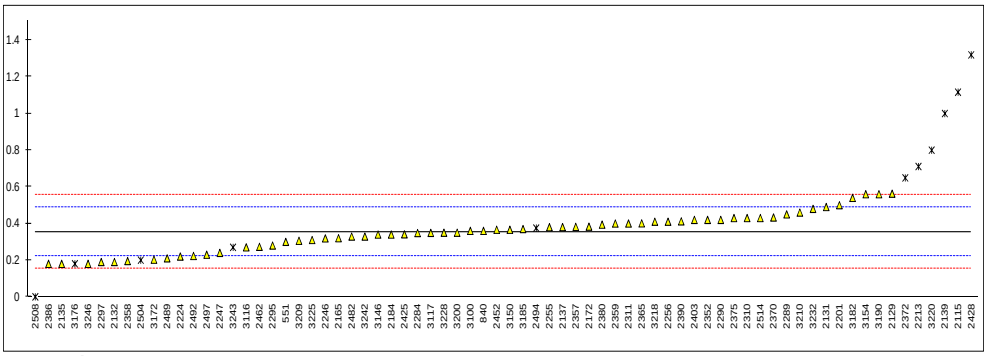
Sample #12163

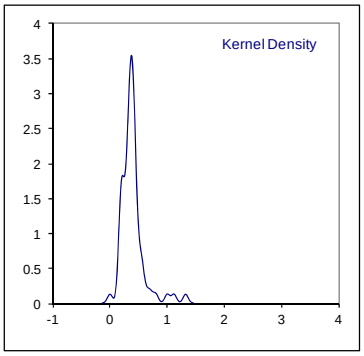
Determination of 2,3,4,6-Tetrachlorophenol on sample #12162 and #12163; results in mg/kg

lab	method	#12162	mark	z(targ)	#12163	mark	z(targ)	Remarks
551	DIN53313	0.3		-0.83	1.1		0.27	
840	in house	0.36		0.08	0.81		-1.46	
2115	Oeko-Tex	1.1167	G(0.01)	11.47	2.775	G(0.01)	10.27	
2127		-----		-----	-----		-----	
2129	ISO17070	0.563		3.13	0.752		-1.81	
2131	in house	0.49		2.03	1.54		2.90	
2132	in house	0.19		-2.49	1.03		-0.15	
2135	in house	0.18		-2.64	0.75		-1.82	
2137	in house	0.3807		0.39	0.9676		-0.52	
2139	in house	1.0	G(0.01)	9.72	0.7		-2.12	
2165	LFGB B82.02-8	0.32		-0.53	0.85		-1.22	
2172		0.383		0.42	1.17		0.69	
2184	LFGB B82.02-8	0.34		-0.23	0.89		-0.99	
2196	ISO17070	n.d.		-----	0.91		-0.87	
2201	ISO17070	0.50		2.18	1.36		1.82	
2213	LFGB B82.02-8	0.711	G(0.01)	5.36	1.592		3.21	
2224	in house	0.22		-2.03	0.979		-0.45	
2244		-----		-----	-----		-----	
2246	in house	0.319		-0.54	0.957		-0.59	
2247	LFGB 82.02-8	0.24		-1.73	0.851		-1.22	
2255	LFGB B82.02-8	0.38		0.38	0.93		-0.75	
2256	LFGB B82.02-8	0.41		0.83	0.95		-0.63	
2261		-----		-----	-----		-----	
2272	INH-8015	n.d.		-----	n.d.		-----	
2284	ISO17070	0.348		-0.11	1.03		-0.15	
2289	ISO17070	0.45		1.43	1.15		0.57	
2290	LFGB B82.02-8	0.42		0.98	1.13		0.45	
2295	LMGB 82.02-8	0.28		-1.13	0.91	C	-0.87	First reported 1.45
2296	ISO17070	<1.0		-----	1.26		1.22	
2297		0.19		-2.49	0.78		-1.64	
2300		-----		-----	-----		-----	
2310	LFGB	0.43		1.13	1.20		0.87	
2311	LFGB 82.02-8	0.4		0.68	1.07		0.09	
2352	LFGB B82.02-8	0.42		0.98	1.02		-0.21	
2357	LFGB B82.02-8	0.382		0.41	0.974		-0.48	
2358	DIN53313	0.1952		-2.41	0.8198		-1.40	
2359	ISO17070	0.40		0.68	1.00		-0.33	
2365	LFGB B82.02-8	0.401		0.69	1.009		-0.27	
2370	LFGB B82.02-8	0.433		1.17	1.04		-0.09	
2372	in house	0.649	G(0.01)	4.43	1.246		1.14	
2375	LFGB 82.02-8Mod	0.43		1.13	1.04		-0.09	
2379		-----		-----	-----		-----	
2380	in house	0.394		0.59	0.862		-1.15	
2386	LFGB 82.02-8	0.18		-2.64	0.82		-1.40	
2390	LFGB B82.02-8	0.412		0.86	1.331		1.65	
2403	GB/T 18414.1	0.42		0.98	0.95		-0.63	
2410	LFGB B82.02-8	<0.5		-----	<0.5		-----	
2425	LFGB B82.02-8	0.341		-0.21	1.147		0.55	
2428	GB/T18414.1	1.32	G(0.01)	14.54	1.16		0.63	
2452	INH-0815	0.366		0.17	1.092		0.22	
2461		-----		-----	-----		-----	
2462	LMBG 82.02-8	0.273		-1.24	1.168		0.67	
2482	in house	0.329		-0.39	1.12		0.39	
2488		-----		-----	-----		-----	
2489	LFGB 82.02-8	0.21		-2.18	0.80		-1.52	
2492	in house	0.223		-1.99	0.971		-0.50	
2493		-----		-----	-----		-----	
2494	ISO17070	0.375	ex	0.30	0.422	G(0.01)	-3.78	See §4.1
2497	UNI11057	0.23	C	-1.88	1.19	C	0.81	First reported 0.08 and 0.06
2504	in house	0.20	ex	-2.34	0.86	ex	-1.16	See §4.1
2505		-----		-----	-----		-----	
2508	DIN12673	0.0	ex	-5.35	0.0	ex	-6.30	Excluded, zero
2514	LFGB B82.02-8	0.43		1.13	0.969		-0.51	
3100	ISO17070	0.36		0.08	0.99		-0.39	
3104		-----		-----	-----		-----	
3116	LFGB 82.02-8	0.2702		-1.28	0.9296		-0.75	
3117	GB/T18414.1	0.349		-0.09	1.196		0.84	
3146	in house	0.34		-0.23	0.89		-0.99	
3150	in house	0.366		0.17	1.20		0.87	
3153		-----		-----	-----		-----	
3154	ISO17070	0.56		3.09	1.24	C	1.10	First reported 1.71
3172	in house	0.203		-2.29	1.231		1.05	

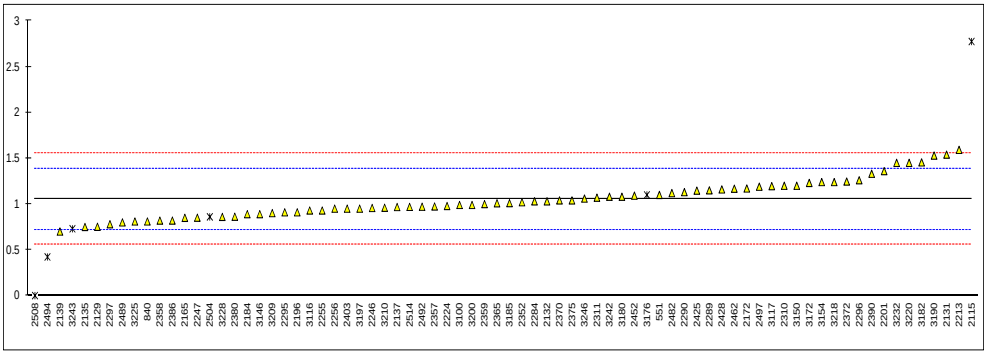
3176	35LMGB 82.02-8	0.18	ex	-2.64	1.1	ex	0.27	See §4.1
3180		-----		-----	1.08		0.15	
3182	LFGB B82.02-8	0.540	C	2.79	1.455	C	2.39	First reported 0.62 and 1.66
3185	ISO17070	0.37		0.23	1.01		-0.27	
3190	LFGB B82.02-8	0.56		3.09	1.53		2.84	
3192		-----		-----	-----		-----	
3197	LFGB 82.02-8	<0.5		-----	0.95		-0.63	
3200	LFGB 82.02-8	0.35		-0.08	0.99	C	-0.39	First reported 1.93
3204		-----		-----	-----		-----	
3209	ISO17070	0.306		-0.74	0.901		-0.92	
3210	INH-8015	0.46		1.58	0.96		-0.57	
3218	64LFGB 82.02-8	0.41		0.83	1.24		1.10	
3220	in house	0.8	C,G(0.05)	6.70	1.45	C	2.36	First reported 0.11 and 0.5
3225		0.31		-0.68	0.81		-1.46	
3228	LFGB B82.02-8	0.35		-0.08	0.86		-1.16	
3232	ISO17070	0.48		1.88	1.45		2.36	
3237		-----		-----	-----		-----	
3242	in house	0.329		-0.39	1.08		0.15	
3243	in house	0.27	ex	-1.28	0.73	ex	-1.94	See §4.1
3246	ISO17070	0.18		-2.64	1.06		0.03	
	normality	OK			OK			
	n	61			70			
	outliers	6			2			
	mean (n)	0.355			1.055			
	st.dev. (n)	0.1004			0.2020			
	R(calc.)	0.281			0.566			
	R(Horwitz)	0.186			0.469			

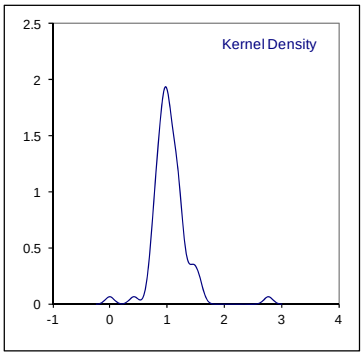
Lab 2508: results excluded, zero is not a real result





Sample #12162



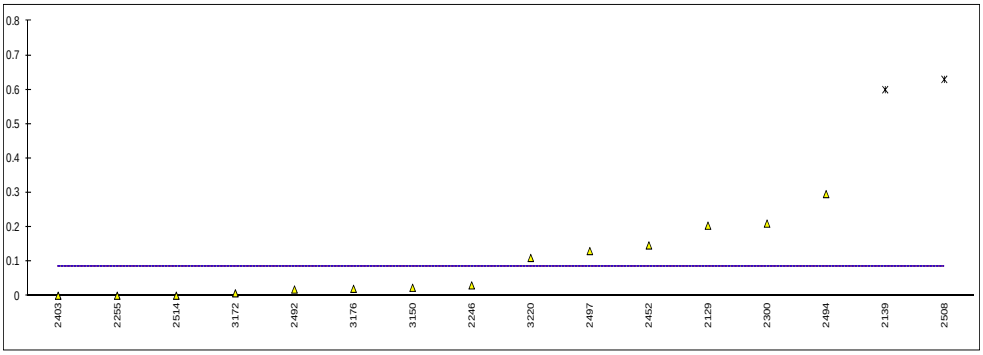


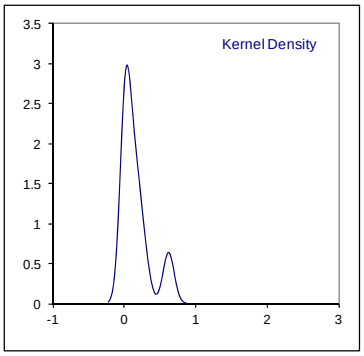
Sample #12163

Determination of 2,3,5,6-Tetrachlorophenol on sample #12162 and #12163; results in mg/kg

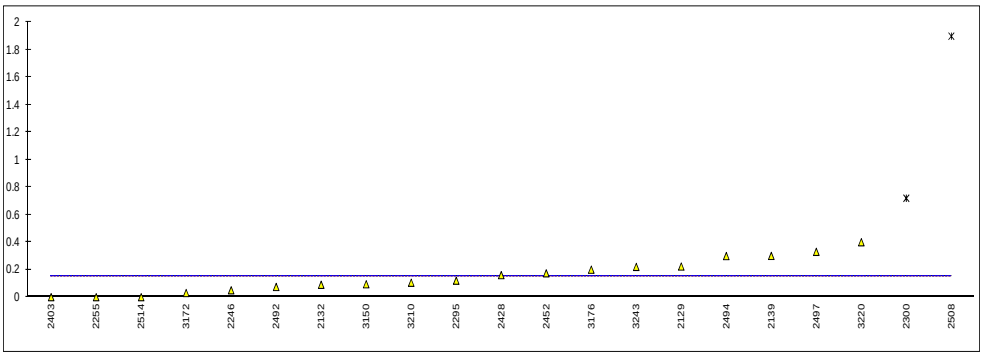
lab	method	#12162	mark	z(targ)	#12163	mark	z(targ)	Remarks
551	DIN53313	n.d.		-----	n.d.		-----	
840	in house	n.d.		-----	n.d.		-----	
2115		-----		-----	-----		-----	
2127		-----		-----	-----		-----	
2129	ISO17070	0.204		-----	0.223		-----	
2131	in house	<0.01		-----	<0.01		-----	
2132	in house	<0.05		-----	0.09		-----	
2135		-----		-----	-----		-----	
2137	in house	<0.1		-----	<0.1		-----	
2139	in house	0.6	DG(0.01)	-----	0.3		-----	
2165	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2172		n.d.		-----	n.d.		-----	
2184	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2196	ISO17070	n.d.		-----	n.d.		-----	
2201	ISO17070	<0.5		-----	<0.5		-----	
2213	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2224	in house	n.d.		-----	n.d.		-----	
2244		-----		-----	-----		-----	
2246	in house	0.030		-----	0.050		-----	
2247		-----		-----	-----		-----	
2255	LFGB B82.02-8	0.0		-----	0.0		-----	
2256	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2261		-----		-----	-----		-----	
2272	INH-8015	n.d.		-----	n.d.		-----	
2284	ISO17070	<0.05		-----	<0.05		-----	
2289		-----		-----	-----		-----	
2290	LFGB B82.02-8	<0.20		-----	<0.20		-----	
2295	LMGB 82.02-8	n.d.		-----	0.12	C	-----	First reported n.d.
2296	ISO17070	<1.0		-----	<1.0		-----	
2297		<0.05		-----	<0.05		-----	
2300	ISO17070	0.21		-----	0.72	G(0.01)	-----	
2310	LFGB	n.d.		-----	n.d.		-----	
2311	LFGB 82.02-8	n.d.		-----	n.d.		-----	
2352	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2357	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2358	DIN53313	<0.1		-----	<0.1		-----	
2359	ISO17070	n.d.		-----	n.d.		-----	
2365	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2370	LFGB B82.02-8	n.d.		-----	n.d.		-----	
2372	in house	n.d.		-----	n.d.		-----	
2375	LFGB 82.02-8Mod	n.d.		-----	n.d.		-----	
2379		-----		-----	-----		-----	
2380	in house	n.d.		-----	n.d.		-----	
2386	LFGB 82.02-8	<0.1		-----	<0.1		-----	
2390		-----		-----	-----		-----	
2403		0		-----	0		-----	
2410	LFGB B82.02-8	<0.5		-----	<0.5		-----	
2425	64LFGB B82.02-8	n.d.		-----	n.d.		-----	
2428	GB/T18414.1	n.d.		-----	0.16		-----	
2452	INH-0815	0.14648		-----	0.1737		-----	
2461		-----		-----	-----		-----	
2462	LMBG 82.02-8	n.d.		-----	n.d.		-----	
2482	in house	n.d.		-----	n.d.		-----	
2488		-----		-----	-----		-----	
2489		-----		-----	-----		-----	
2492	in house	0.018		-----	0.074		-----	
2493		-----		-----	-----		-----	
2494	ISO17070	0.296		-----	0.299		-----	
2497	UNI11057	0.13		-----	0.33		-----	
2504	in house	n.d.		-----	n.d.		-----	
2505		-----		-----	-----		-----	
2508	DIN12673	0.63	DG(0.01)	-----	1.90	G(0.01)	-----	
2514	LFGB B82.02-8	0.0		-----	0.0		-----	
3100	ISO17070	n.d.		-----	n.d.		-----	
3104		-----		-----	-----		-----	
3116	LFGB 82.02-8	n.d.		-----	n.d.		-----	
3117		-----		-----	-----		-----	
3146	in house	<0.1		-----	<0.1		-----	
3150	in house	0.023		-----	0.094		-----	
3153		-----		-----	-----		-----	
3154		-----		-----	-----		-----	
3172	in house	0.007		-----	0.030		-----	

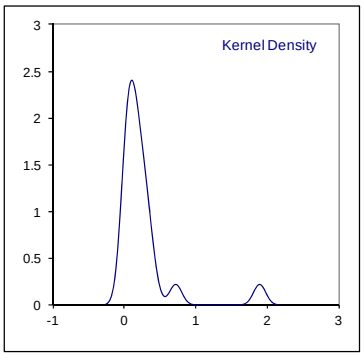
3176	35LMGB 82.02-8	0.02	-----	0.2	-----
3180		-----	-----	-----	-----
3182		-----	-----	-----	-----
3185	ISO17070	n.d.	-----	n.d.	-----
3190		-----	-----	-----	-----
3192		-----	-----	-----	-----
3197	LFGB 82.02-8	<0.5	-----	<0.5	-----
3200	LFGB 82.02-8	n.d.	-----	n.d.	-----
3204		-----	-----	-----	-----
3209	ISO17070	n.d.	-----	n.d.	-----
3210		-----	-----	0.105	-----
3218		-----	-----	-----	-----
3220	in house	0.11	-----	0.4	-----
3225		-----	-----	-----	-----
3228	LFGB B82.02-8	n.d.	-----	n.d.	-----
3232	ISO17070	<0.05	-----	<0.05	-----
3237		-----	-----	-----	-----
3242	in house	n.d.	-----	n.d.	-----
3243		-----	-----	0.22	-----
3246	ISO17070	n.d.	-----	n.d.	-----
	normality	n.a.		n.a.	
	n	14		19	
	outliers	2		2	
	mean (n)	0.085		0.151	
	st.dev. (n)	n.a.		n.a.	
	R(calc.)	n.a.		n.a	
	R(lit)	n.a.		n.a.	





Sample #12162





Sample #12163

APPENDIX 2

Details of the methods used by the participants for OPP determination:

Lab	Used Method for extraction OPP	Used Method for extraction PCP/TCEP
551	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
840	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2115	Soxhlet/ ASE extraction	Soxhlet/ ASE extraction
2127	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2129	Soxhlet/ ASE extraction	Soxhlet/ ASE extraction
2131	Soxhlet/ ASE extraction	Soxhlet/ ASE extraction
2132	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2135	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2137	Basic/Ultrasonic extraction	Soxhlet/ ASE extraction
2139	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2165	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2172	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2184	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2196	Steam distillation	Steam distillation
2201	Steam distillation	Steam distillation
2213	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2224	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2244	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2246	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2247	Steam distillation	Steam distillation
2255	Steam distillation	Steam distillation
2256	Steam distillation	Steam distillation
2261	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2272	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2284	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2289	Steam distillation	Steam distillation
2290	--	Steam distillation
2295	Steam distillation	Steam distillation
2296	--	Steam distillation
2297	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2300	--	Soxhlet/ ASE extraction
2310	Basic/Ultrasonic extraction	Steam distillation
2311	Basic/Ultrasonic extraction	Steam distillation
2352	Basic/Ultrasonic extraction	Steam distillation
2357	Basic/Ultrasonic extraction	Steam distillation
2358	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2359	Basic/Ultrasonic extraction	Steam distillation
2365	Basic/Ultrasonic extraction	Steam distillation
2370	Basic/Ultrasonic extraction	Steam distillation
2372	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2375	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2379	--	--
2380	Steam distillation	Basic/Ultrasonic extraction
2386	--	--
2390	Basic/Ultrasonic extraction	Steam distillation
2403	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2410	Steam distillation	Steam distillation
2425	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2428	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2452	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2461	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2462	Steam distillation	Steam distillation
2482	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2488	--	--
2489	Steam distillation	Steam distillation
2492	Soxhlet/ ASE extraction	Soxhlet/ ASE extraction
2493	--	--
2494	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2497	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2504	Steam distillation	Steam distillation
2505	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
2508	Soxhlet/ ASE extraction	Soxhlet/ ASE extraction
2514	Steam distillation	Steam distillation
3100	--	Steam distillation
3104	--	Basic/Ultrasonic extraction
3116	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction

3117	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3146	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3150	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3153	--	Steam distillation
3154	Basic/Ultrasonic extraction	Steam distillation
3172	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3176	Soxhlet/ ASE extraction	Basic/Ultrasonic extraction
3180	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3182	--	Steam distillation
3185	--	Steam distillation
3190	--	Steam distillation
3192	--	Basic/Ultrasonic extraction
3197	Basic/Ultrasonic extraction	Steam distillation
3200	Steam distillation	Steam distillation
3204	--	Steam distillation
3209	Steam distillation	Steam distillation
3210	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3218	--	Steam distillation
3220	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3225	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3228	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3232	Steam distillation	Steam distillation
3237	--	--
3242	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3243	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction
3246	Basic/Ultrasonic extraction	Basic/Ultrasonic extraction

APPENDIX 3

Number of participants per country

4 labs in	BANGLADESH
1 lab in	BRAZIL
1 lab in	FRANCE
12 labs in	GERMANY
10 labs in	HONG KONG
1 lab in	HUNGARY
9 labs in	INDIA
1 lab in	INDONESIA
3 labs in	ITALY
3 labs in	KOREA
28 labs in	P.R. of CHINA
1 lab in	PAKISTAN
2 labs in	SWITZERLAND
2 labs in	TAIWAN R.O.C.
3 labs in	THAILAND
1 lab in	TUNESIA
6 labs in	TURKEY
1 lab in	UNITED KINGDOM
3 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
n.a.	= not applicable
n.d.	= not detected
ex	= excluded
cfr.	= conform

Literature:

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, January 2010
2 Official Journal of the European Communities L133/29 : May 2002
3 Öko-Tex Standard 100; February 2012
4 Thai Green label, TGL-16. July 2002
5 Impacts of Environmental Standards and requirements in EU Countries, Aug 99
6 Horwitz, Journal of AOAC International Vol. 79 No.3, 1996
7 P.L. Davies, Fr Z. Anal. Chem, 351, 513, (1988)
8 W.J. Conover, Practical; Nonparametric Statistics, J. Wiley&Sons, NY, p.302, (1971)
9 ISO 5725:1986
10 ISO 5725, parts 1-6, (1994)
11 ISO105 E4:1994
12 ISO14184-1:1994
13 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
14 Analytical Methods Committee Technical brief, No4 February 2001.
15 The Royal Society of Chemistry 2002, Analyst 2002, 127 page 1359-1364, P.J. Lowthian and M. Thompson (see http://www.rsc.org/suppdata/an/b2/b205600n/)
16 ISO 13528:2005, Statistical methods for use in proficiency testing by interlaboratory comparisons