**Institute for
Interlaboratory Studies**

Results of Proficiency Test
Specific Migration on
Food Contact Materials
October 2022

Organized by: **Institute for Interlaboratory Studies
Spijkenisse, the Netherlands**

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Appendices:

1   INTRODUCTION

During the contact of food with materials (like kitchenware) molecules can migrate from the material to the food. Because of this, in many countries regulations are made to ensure food safety. The framework Regulation (EU) No. 10/2011 applies to all food contact materials and describes a large number of requirements, e.g. limits for Overall Migration and Specific Migration limits for certain constituents. Article 11 (and Annex II) of this regulation describes the Specific Migration limit, expressed in mg/kg food or food simulant.

Since 2012 the Institute of Interlaboratory Studies (iis) organizes a proficiency scheme for the determination of Specific Migration on Food Contact Materials every year. During the annual proficiency testing program 2022/2023 it was decided to continue the proficiency test for the determination of Specific Migration on Food Contact Materials.

In this interlaboratory study 36 laboratories in 18 countries registered for participation. See appendix 5 for the number of participants per country. In this report the results of the Specific Migration proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2   SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.
It was decided to send two different samples. The first sample was a polypropylene plate labelled #22720. The second sample was a polycarbonate food cup labelled #22721.
The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1   ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2   PROTOCOL

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

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

For the first sample a batch of off-white polypropylene plates prepared with Bisphenol A (BPA) was selected. The subsamples were labelled #22720.
The homogeneity of the subsamples was checked by determination of the Specific Migration of BPA by an in house test method on 8 stratified randomly selected subsamples. Migration conditions: 3% Acetic Acid, 2 hours at 100 °C.

	BPA in mg/l
sample #22720-1	1.24
sample #22720-2	1.38
sample #22720-3	1.44
sample #22720-4	1.35
sample #22720-5	1.19
sample #22720-6	1.36
sample #22720-7	1.41
sample #22720-8	1.21

Table 1: homogeneity test results of subsamples #22720

From the above test results the relative standard deviation (RSD) was calculated and compared with 0.3 times the average relative standard deviation obtained from previous iis PTs with BPA in agreement with the procedure of ISO13528, Annex B2 in the next table.

	BPA
RSD%(observed)	7
reference method	iis PTs
0.3 x RSD% (reference method)	13

Table 2: evaluation of the relative standard deviations of subsamples #22720

The calculated relative standard deviation is in agreement with 0.3 times the average relative standard deviation obtained from the previous iis PTs with Specific Migration on Food Contact Materials with BPA. Therefore, homogeneity of the subsamples was assumed.

For the second sample a batch of polycarbonate cups prepared with some heavy metals was selected and labelled #22721.

The batch for sample #22721 was used in a previous iis proficiency test on Specific Migration as sample #18620 in iis18P10SM. Therefore, homogeneity of the subsamples was assumed.

To each of the participating laboratories one plate labelled #22720 and one cup labelled #22721 were sent on September 7, 2022.

2.5 ANALYZES

The participants were requested to determine BPA on sample #22720 using the prescribed test conditions (total immersion, 2 hours at 100 °C and 3% M/V Acetic Acid as simulant). For sample #22721 it was requested to determine: Aluminum as Al, Barium as Ba, Cobalt as Co, Copper as Cu, Iron as Fe, Lithium as Li, Manganese as Mn, Nickel as Ni and Zinc as Zn using the prescribed conditions (Article filling, single use, 2 hours at 100 °C and 3% Acetic Acid as simulant).
It was also requested to report for both samples if the laboratory was accredited for the requested components that were determined and to report a few analytical details.

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

To get comparable test results a detailed report form and a letter of instructions are prepared. On the report form the reporting units are given as well as the reference test methods (when applicable) that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis-cts/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis-cts/. The reported test results are tabulated per sample and per determination in appendices 1, 2 and 3 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no re-analysis). Additional or corrected test results are used for data analysis and the original test results are placed under

'Remarks' in the result tables in appendices 1 and 2. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

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

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

The assigned value is determined by consensus based on the test results of the group of participants after rejection of the statistical outliers and/or suspect data.

According to ISO13528 all (original received or corrected) results per determination were submitted to outlier tests. In the iis procedure for proficiency tests, outliers are detected prior to calculation of the mean, standard deviation and reproducibility. For small data sets, Dixon (up to 20 test results) or Grubbs (up to 40 test results) outlier tests can be used. For larger data sets (above 20 test results) Rosner's outlier test can be used. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1. was met for all evaluated tests, therefore, the uncertainty of all assigned values may be negligible and need not be included in the PT report.

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

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis.

The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve (dotted line) was projected over the Kernel Density Graph (smooth line) for reference. The Gauss curve is calculated from the consensus value and the corresponding standard deviation.

3.3 Z-SCORES

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

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used, like Horwitz or an estimated reproducibility based on former iis proficiency tests.

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

The z-scores were calculated according to:

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

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

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

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

4   EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. No participants reported test results after the final reporting date and one participant did not report any test results. Not all participants were able to report all tests requested.
In total 35 participants reported 262 numerical test results in mg/dm^2. Observed were 23 outlying test results, which is 8.8%. In proficiency studies outlier percentages of 3% - 7.5% are quite normal.

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

4.1   EVALUATION PER SAMPLE AND PER COMPONENT

In this section the reported test results are discussed per sample and per component. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data. The abbreviations, used in these tables, are explained in appendix 6.

In the past iis has observed that for the Overall and Specific Migration methods the limits and the calculations are mixed up by participants. Therefore, iis issued a White Paper on this subject in February 2018 (see lit. 14) to help participants understand the differences between the two migration methods, the units used for reporting and the regulated limits.

For the determination of Specific Migration, several test methods exist. The most relevant test method is method EN13130 part 1. Method EN13130 part 1 describes how the Specific Migration test should be performed. Regretfully, no reference test method is available with precision requirements for the migration of BPA and Metals from food contact materials in mg/dm^2. Therefore, it was decided to estimate the target reproducibilities calculated from the Horwitz equation. The test results of the Specific Migration reported in mg/dm^2 were used for the statistical evaluation.

sample #22720
BPA: This determination was problematic for a number of participants. In total seventeen statistical outliers were observed and ten other test results were excluded over the three migration steps. The calculated reproducibilities of all three migration steps after rejection of the suspect data are in agreement with the corresponding estimated reproducibility calculated with the Horwitz equation.

sample #22721
Barium: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the estimated reproducibility calculated with the Horwitz equation.

Cobalt: This determination was not problematic. No statistical outliers were
                   observed but one test result was excluded. The calculated reproducibility
                   after rejection of the suspect data is in agreement with the estimated
                   reproducibility calculated with the Horwitz equation.

Copper: This determination may be problematic. No statistical outliers were
                   observed but one test result was excluded. The calculated reproducibility
                   after rejection of the suspect data is not in agreement with the estimated
                   reproducibility calculated with the Horwitz equation.

Iron: This determination may be problematic. One statistical outlier was
                   observed and one other test result was excluded. The calculated
                   reproducibility after rejection of the suspect data is not in agreement with
                   the estimated reproducibility calculated with the Horwitz equation.

Manganese: This determination was not problematic. No statistical outliers were
                   observed. The calculated reproducibility is in agreement with the estimated
                   reproducibility calculated with the Horwitz equation.

Nickel: This determination was not problematic. One statistical outlier was
                   observed. The calculated reproducibility after rejection of the statistical
                   outlier is in agreement with the estimated reproducibility calculated with the
                   Horwitz equation.

Zinc: This determination may be problematic. One statistical outlier was
                   observed and one other test result was excluded. The calculated
                   reproducibility after rejection of the suspect data is not in agreement with
                   the estimated reproducibility calculated with the Horwitz equation.

The majority of participants agreed on a concentration near or below the limit of detection for
the other requested metals. Therefore, no z-scores are calculated. See appendix 2 for the
reported test results.

4.2   PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the reference test
method and the reproducibility as found for the group of participating laboratories. The
number of significant test results, the average, the calculated reproducibility (2.8 * standard
deviation) and the target reproducibility derived from reference methods are presented in the
next tables.

Component	unit	n	average	2.8 * sd	R(target)
BPA – step 1	mg/dm^2	18	0.430	0.195	0.219
BPA – step 2	mg/dm^2	18	0.293	0.170	0.158
BPA – step 3	mg/dm^2	18	0.222	0.138	0.127

Table 3: Reproducibilities of components on sample #22720

Without further statistical calculations it can be concluded that for BPA there is a good compliance of the group of laboratories with the relevant target reproducibility.

Component	unit	n	average	2.8 * sd	R(target)
Barium	mg/dm²	24	0.019	0.010	0.016
Cobalt	mg/dm²	30	0.187	0.098	0.108
Copper	mg/dm²	30	0.554	0.313	0.271
Iron	mg/dm²	27	0.042	0.035	0.031
Manganese	mg/dm²	15	0.003	0.002	0.003
Nickel	mg/dm²	16	0.002	0.001	0.002
Zinc	mg/dm²	29	0.344	0.202	0.181

Table 4: Reproducibilities of components on sample #22721

For the determination of majority of the metals there is a good compliance of the group of laboratories with the relevant target reproducibilities. See for discussion also paragraph 4.1 and 5.

4.3   COMPARISON OF PROFICIENCY TEST OF OCTOBER 2022 WITH PREVIOUS PTS

The uncertainty for Specific Migration in mg/dm² as observed in this PT and the comparison with the findings in previous rounds are listed in below table.

Year	Components	Type of migration	Observed RSD%	Target RSD%	Concentration range mg/dm²
2012	Formaldehyde	article filling	41 – 47	20 – 140	3 – 0.2
2013	Formaldehyde	article filling	41 – 61	14 – 20	3 – 0.2
2014	Bisphenol-A	total immersion	44 – 52	14 – 20	3 – 0.2
2015	DEHP	total immersion	34 – 40	14 – 20	3 – 0.2
2016	Metals	total immersion	29 – 30	14 – 20	3 – 0.2
2017	Bisphenol-A	article filling	33 – 50	20 – 33	0.2 – 0.009
2018	Metals	article filling	21 – 35	17 – 38	0.6 – 0.003
2019	DEHP/DAP	article filling	24 – 34	19 – 20	0.34 – 0.20
2020	Formaldehyde	article filling	28 – 51	17 – 19	0.62 – 0.32
	Metals	article filling	17 – 20	19 – 20	0.32 – 0.22
2021	MDA	article filling	70 – 84	41 – 82	0.008 – 0.004
	Metals	total immersion	18 – 44	17 – 26	0.6 – 0.04
2022	Bisphenol A	total immersion	16 – 22	18 – 20	0.43 – 0.22
	Metals	article filling	19 – 29	21 – 26	0.19 – 0.04

Table 5: comparison of the uncertainties in % for Specific Migration in the present and previous iis PTs

From the above table it is clear that the performance of this PT is in line with the previous iis PTs.

4.4   EVALUATION OF THE ANALYTICAL DETAILS

The reported analytical details that were reported by the participants are listed in appendix 4. Twenty-one of the reporting participants are accredited for the determination of the Specific Migration of BPA and twenty-nine are accredited for the Specific Migration of Metals.

For sample #22720 (BPA) eight participants reported to clean the sample for the determination of Specific Migration of which one participant reported to clean the cup with lint-free cloth. Five participants reported to use a liquid for cleaning which is not in line with test method EN13130-1 paragraph 15.5. Almost all reporting participants preheated the simulant solution except one participant.

For sample #22721 (Metals) ten participants reported to clean the sample before the determination of the Specific Migration of which one participant reported to clean the cup with lint-free cloth. Seven participants reported to use a liquid for cleaning which is not in line with test method EN13130-1 paragraph 15.5. Almost all reporting participants preheated the simulant solution except four participants.

Most of the participants reported to use a seal during the test. Several different types of seals were reported by the participants, e.g. a plastic film/foil, an aluminum film, a glass plate or an airtight container. Most of the participants had used an oven.

None of the above details have shown an apparent influence on the test results in this PT.

5   DISCUSSION

Before the start of this proficiency test it was assumed that a wide range of test results would be reported when the choice of the test conditions would have been left to the participating laboratories. Therefore, a set of predetermined test conditions was given together with the instructions to all participants for both PT samples.

For sample #22720 (BPA) not only migration results in mg/dm^2 was requested, but also to report the intermediate BPA concentrations in the simulant per migration step. The reported BPA concentrations are listed in appendix 3. Using these intermediate test results the calculation from mg/L to mg/dm^2 was checked. It appeared that no calculation differences are observed between the test results and calculations done by iis.

The reported contact surfaces varied from $0.3 – 4.08 \ dm^2$. However, it is observed that nineteen participants reported a surface around $2.1 \ dm^2$. Eight participants reported a surface smaller than $1.3 \ dm^2$. It is assumed that these participants did not use the whole plate but a part. No correlation could be found between the reported contact surface and the measured BPA concentration in mg/dm^2.

The test results of sample #22720 (BPA) show that about 90% of the participants reported the results for 1st migration > 2nd migration > 3rd migration which one would have expected with 3 subsequent migration steps. Three participants reported a deviating pattern. The new EU regulation 1245/2020 the 15th amendment of EU10/2011 has been approved in September 2020 and should have been implemented before March 27, 2021 for new products and in 2022 for existing products. In this amendment new approval regulations are mentioned. For repeated use the migration test result should be less for each following step (SM1>SM2>SM3). The third step is leading for the assessment of the approval of the sample. Therefore. it was decided to exclude the test results with deviating pattern from the statistical evaluation.

For sample #22721 (Metals) the participants were also requested to report the metal concentrations in mg/L of the simulant (listed in appendix 3). Using these intermediate test results the calculation from mg/L to mg/dm^2 was checked. Unfortunately, several calculation differences were observed between the test results and calculations done by iis.

The limits for specific migration for BPA (see table 6) and Metals (see table 7) are mentioned in mg/kg food or food simulant. It is mentioned in EN13130-1 that the limits expressed in mg/kg shall be divided by the conventional conversion factor of 6 in order to express them in mg/dm^2, see next tables.

Component	Specific Migration Detection Limit in mg/kg food or food simulant	Specific Migration Detection Limit in mg/dm^2
BPA	0.6	0.1

Table 6: Specific Migration maximum limits according to 10/2011/EU

Twenty-two participants would have rejected sample #22720 for too much BPA in the third step, while five would have accepted the sample.

Component	Specific Migration Limit in mg/kg food or food simulant	Specific Migration Limit in mg/dm^2
Barium	1	0.167
Cobalt	0.05	0.008
Copper	5	0.833
Iron	48	8
Manganese	0.6	0.1
Zinc	25	4

Table 7: Specific Migration maximum limits according to 10/2011/EU (ANNEX II)

All reporting participants would have rejected sample #22721 for too much Cobalt.

Sample #22721 was used earlier as sample #18620 in iis18P10SM (2018). In table 8 a comparison is given.

	unit	sample #22721			sample #18620		
		n	average	R(calc)	n	average	R(calc)
Barium	mg/dm²	24	0.019	0.010	20	0.019	0.014
Cobalt	mg/dm²	30	0.19	0.10	22	0.18	0.11
Copper	mg/dm²	30	0.55	0.31	22	0.53	0.34
Iron	mg/dm²	27	0.042	0.035	21	0.041	0.024
Manganese	mg/dm²	15	0.003	0.002	17	0.003	0.002
Nickel	mg/dm²	16	0.002	0.001	n.e.	n.e.	n.e.
Zinc	mg/dm²	29	0.34	0.20	22	0.35	0.34

Table 8: comparison of sample #22721 with #18620

It is observed that the group in this PT performed in line with the previous determination of these metals.

6   CONCLUSION

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

APPENDIX 1

Determination of 1st Specific Migration of BPA on sample #22720; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		0.33		-1.28	
362	EN13130-13	0.468		0.49	
622	EN13130-13	0.04021	R(0.01)	-4.99	
1099	EN13130-1	0.83320	R(0.01)	5.16	
2115	EN13130-13	0.39		-0.51	
2132	EN13130-1	0.228	ex	-2.59	test result excluded, SM1>SM2<SM3, see paragraph 5
2159		-----		-----	
2284	EN13130-1	0.451		0.27	
2297	EN13130-1	0.404		-0.33	
2320		-----		-----	
2352	EN13130-13	0.37		-0.77	
2366	GB31604.10	0.41		-0.26	
2384	EN13130-1	1.6055	C,R(0.01)	15.05	first reported 1.6911
2385	EN13130-13	0.62		2.43	
2446		-----		-----	
2475		-----		-----	
2495	EN13130-13	0.4048		-0.32	
2573	EN13130-13	0.381		-0.63	
2634		-----		-----	
2689		-----		-----	
2787		0.3052		-1.60	
2860	EN13130-1	0.49567		0.84	
2892	EN13130-13	0.46142		0.40	
2897		-----		-----	
2901	EN13130-1	0.485		0.71	
2953	EN13130-13	0.1646	ex	-3.40	test result excluded, SM1<SM2>SM3, see paragraph 5
2998		-----		-----	
3002	EN13130-13	0.647	ex	2.78	test result excluded, SM1<SM2>SM3, see paragraph 5
3100	EN13130-13	0.4355		0.07	
3122		1.207	R(0.01)	9.95	
3163	EN13130-1	0.00	R(0.01)	-5.50	
3172	EN13130-13	0.0653	C,R(0.01)	-4.67	first reported 1.3059
3182	EN13130-13	0.44		0.13	
3185	EN13130-13	0.457		0.35	
8030	EN13130-13	0.43		0.00	

normality	not OK		
n	18		
outliers	6 + 3ex		
mean (n)	0.42992		
st.dev. (n)	0.069475	RSD = 16%	
R(calc.)	0.19453		
st.dev.(Horwitz)	0.078107		
R(Horwitz)	0.21870		

Kernel Density
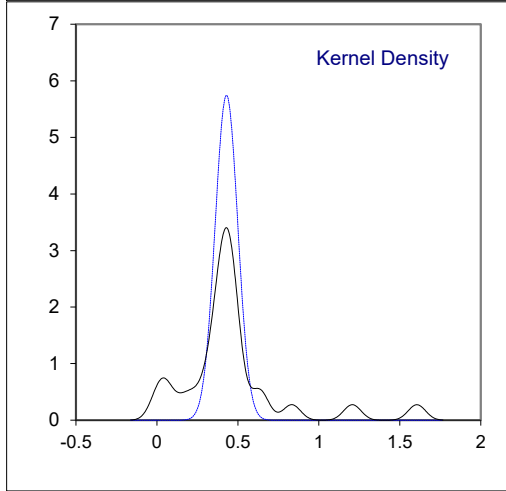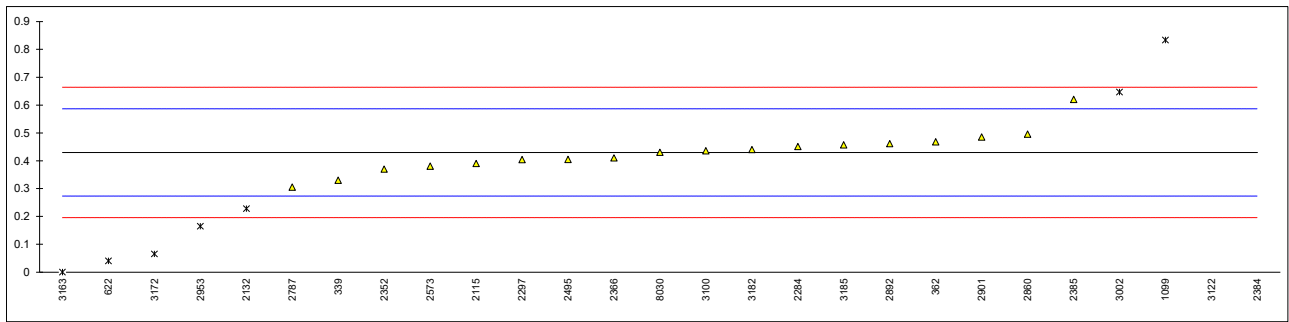
Determination of 2nd Specific Migration of BPA on sample #22720; results in mg/dm^2 per contact surface

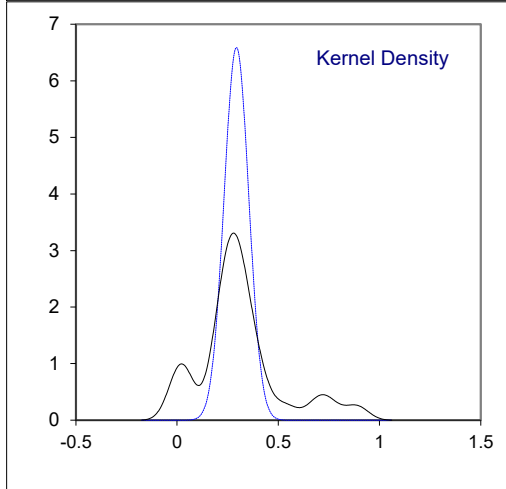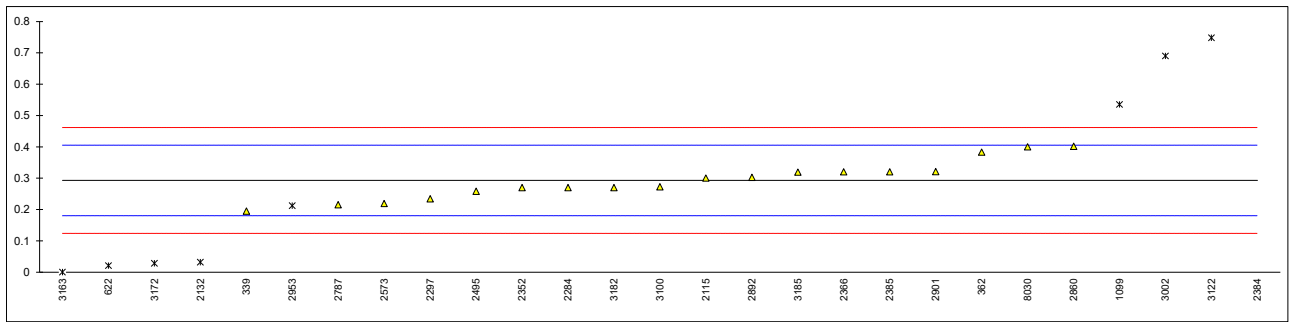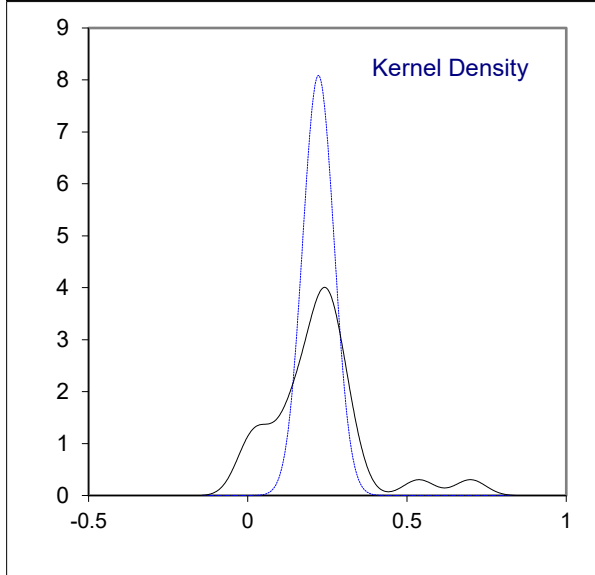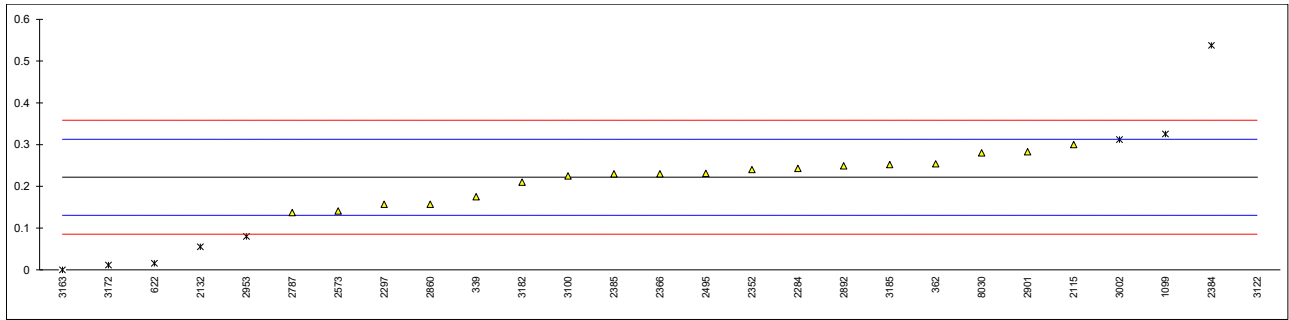| lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		0.195		-1.74	
362	EN13130-13	0.383		1.60	
622	EN13130-13	0.02095	R(0.05)	-4.82	
1099	EN13130-1	0.53510	R(0.05)	4.30	
2115	EN13130-13	0.30		0.13	
2132	EN13130-1	0.0318	ex,C	-4.63	result excluded, SM1>SM2<SM3, see par. 5, fr 0.055
2159		-----		-----	
2284	EN13130-1	0.270		-0.41	
2297	EN13130-1	0.234		-1.04	
2320		-----		-----	
2352	EN13130-13	0.27		-0.41	
2366	GB31604.10	0.32		0.48	
2384	EN13130-1	0.8861	C,R(0.05)	10.52	first reported 0.9333
2385	EN13130-13	0.32		0.48	
2446		-----		-----	
2475		-----		-----	
2495	EN13130-13	0.2582		-0.61	
2573	EN13130-13	0.219		-1.31	
2634		-----		-----	
2689		-----		-----	
2787		0.215		-1.38	
2860	EN13130-1	0.40187		1.93	
2892	EN13130-13	0.30278		0.18	
2897		-----		-----	
2901	EN13130-1	0.321		0.50	
2953	EN13130-13	0.2124	ex	-1.43	test result excluded, SM1<SM2>SM3, see paragraph 5
2998		-----		-----	
3002	EN13130-13	0.690	ex	7.05	test result excluded, SM1<SM2>SM3, see paragraph 5
3100	EN13130-13	0.2724		-0.36	
3122		0.748	R(0.05)	8.07	
3163	EN13130-1	0.00	R(0.05)	-5.20	
3172	EN13130-13	0.0278	C,R(0.05)	-4.70	first reported 0.0555
3182	EN13130-13	0.27		-0.41	
3185	EN13130-13	0.319		0.46	
8030	EN13130-13	0.40		1.90	
	normality	OK			
	n	18			
	outliers	6 + 3ex			
	mean (n)	0.29285			
	st.dev. (n)	0.060552	RSD = 21%		
	R(calc.)	0.16955			
	st.dev.(Horwitz)	0.056369			
	R(Horwitz)	0.15783			

Determination of 3rd Specific Migration of BPA on sample #22720; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		0.175		-1.03	
362	EN13130-13	0.254		0.71	
622	EN13130-13	0.01571	R(0.05)	-4.54	
1099	EN13130-1	0.32520	ex	2.27	test result excluded, SM1 and SM2 are outliers
2115	EN13130-13	0.30		1.72	
2132	EN13130-1	0.055	ex,C	-3.67	result excluded, SM1>SM2<SM3, see par. 5, fr 0.0318
2159		-----		-----	
2284	EN13130-1	0.243		0.46	
2297	EN13130-1	0.157		-1.43	
2320		-----		-----	
2352	EN13130-13	0.24		0.40	
2366	GB31604.10	0.23		0.18	
2384	EN13130-1	0.5375	CR(0.05)	6.94	first reported 0.5661
2385	EN13130-13	0.23		0.18	
2446		-----		-----	
2475		-----		-----	
2495	EN13130-13	0.2309		0.20	
2573	EN13130-13	0.141		-1.78	
2634		-----		-----	
2689		-----		-----	
2787		0.137		-1.87	
2860	EN13130-1	0.15702		-1.43	
2892	EN13130-13	0.24905		0.60	
2897		-----		-----	
2901	EN13130-1	0.283		1.34	
2953	EN13130-13	0.0802	ex	-3.12	test result excluded, SM1<SM2>SM3, see paragraph 5
2998		-----		-----	
3002	EN13130-13	0.312	ex	1.98	test result excluded, SM1<SM2>SM3, see paragraph 5
3100	EN13130-13	0.2249		0.07	
3122		0.700	R(0.01)	10.52	
3163	EN13130-1	0.00	R(0.05)	-4.88	
3172	EN13130-13	0.0114	C,R(0.05)	-4.63	first reported 0.0227
3182	EN13130-13	0.21		-0.26	
3185	EN13130-13	0.252		0.66	
8030	EN13130-13	0.28		1.28	

normality	OK		
n	18		
outliers	5 + 4ex		
mean (n)	0.22188		
st.dev. (n)	0.049344	RSD = 22%	
R(calc.)	0.13816		
st.dev.(Horwitz)	0.045456		
R(Horwitz)	0.12728		

Determination of Specific Migration of Barium as Ba on sample #22721; results in mg/dm^2 per contact surface

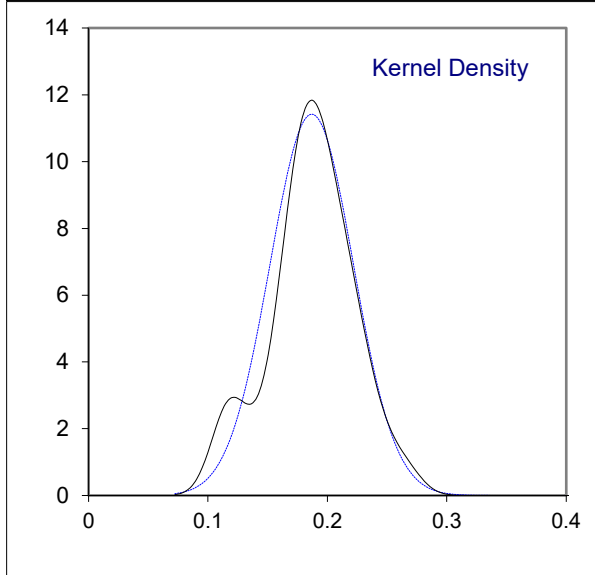| lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.1568	C,E,G(0.01)	24.71	fr 15.22 mg/dm2, calc. diff., iis calc.: 0.13565
622	EN13130-1	0.01418		-0.90	
1099		0.0190		-0.04	
2115	EN13130-1	0.02		0.14	
2132	In house	0.0216		0.43	
2159	EN13130-1	0.01139		-1.40	
2284	EN13130-1	0.022		0.50	
2297	EN13130-1	Not detected		-----	
2320	EN13130-1	0.016		-0.57	
2352	EN13130-1	0.02		0.14	
2366	EN13130-1	<0.0225		-----	
2384	EN13130-1	0.019		-0.04	
2385	EN13130-1	0.0185		-0.13	
2446	EN13130-1	0.01849		-0.13	
2475	EN13130-1	0.02196		0.50	
2495	EN13130-1	0.0166		-0.47	
2573		-----		-----	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.0157		-0.63	
2860	In house	0.018830		-0.07	
2892	EN13130-1	0.038671	R(0.05)	3.50	
2897	EN13130-1	0.019		-0.04	
2901	EN13130-1	0.021		0.32	
2953	ISO17294-2	0.019		-0.04	
2998	In house	0.01491		-0.77	
3002	EN13130-1	0.0339	E, R(0.05)	2.64	calculation difference, iis calculated: 0.01161
3100	EN13130-1	0.02534		1.10	
3122		<0.24		-----	
3163		-----		-----	
3172	EN13130-1	0.0191		-0.02	
3182	EN13130-1	0.026		1.22	
3185	EN13130-1	0.0267		1.35	
8030	EN13130-1	0.0165		-0.48	
	normality	OK			
	n	24			
	outliers	3			
	mean (n)	0.01920			
	st.dev. (n)	0.003662	RSD = 19%		
	R(calc.)	0.01025			
	st.dev.(Horwitz)	0.005569			
	R(Horwitz)	0.01559			
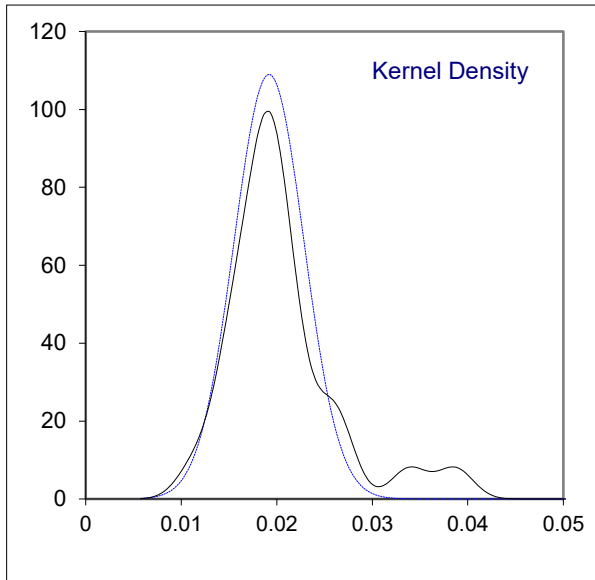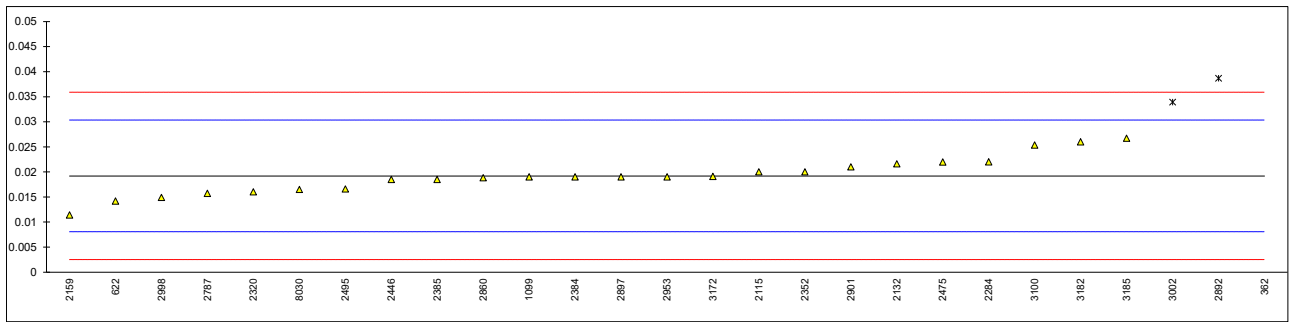
Determination of Specific Migration of Cobalt as Co on sample #22721; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.1713	C	-0.41	first reported 171 mg/dm2
622	EN13130-1	0.19385		0.18	
1099		0.1735	E	-0.35	calculation difference, iis calculated: 0.13565
2115	EN13130-1	0.18		-0.18	
2132	In house	0.2011		0.37	
2159	EN13130-1	0.17318		-0.36	
2284	EN13130-1	0.197		0.26	
2297	EN13130-1	0.21843		0.82	
2320	EN13130-1	0.119		-1.76	
2352	EN13130-1	0.19		0.08	
2366	EN13130-1	0.212		0.65	
2384	EN13130-1	0.224		0.96	
2385	EN13130-1	0.195		0.21	
2446	EN13130-1	0.23596		1.27	
2475	EN13130-1	0.1855		-0.04	
2495	EN13130-1	0.1785		-0.22	
2573	EN13130-1	0.194		0.18	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.1599		-0.70	
2860	In house	0.203377		0.43	
2892	EN13130-1	0.238906		1.35	
2897	EN13130-1	0.215		0.73	
2901	EN13130-1	0.263		1.98	
2953	ISO17294-2	0.181		-0.15	
2998	In house	0.1174		-1.81	
3002	EN13130-1	0.1166		-1.83	
3100	EN13130-1	0.1662		-0.54	
3122		1.2	ex	26.32	test result excluded, result is reported in mg/kg
3163		-----		-----	
3172	EN13130-1	0.2169		0.78	
3182	EN13130-1	0.161		-0.67	
3185	EN13130-1	0.1415		-1.18	
8030	EN13130-1	0.1845		-0.06	

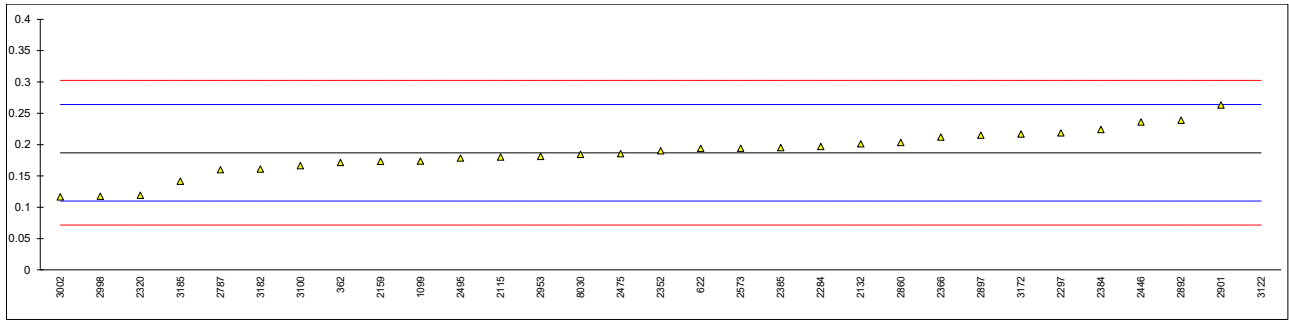|				
	normality	OK		
	n	30		
	outliers	0 + 1ex		
	mean (n)	0.1869		
	st.dev. (n)	0.03493	RSD = 19%	
	R(calc.)	0.0978		
	st.dev.(Horwitz)	0.03849		
	R(Horwitz)	0.1078		

Determination of Specific Migration of Copper as Cu on sample #22721; results in mg/dm^2 per contact surface

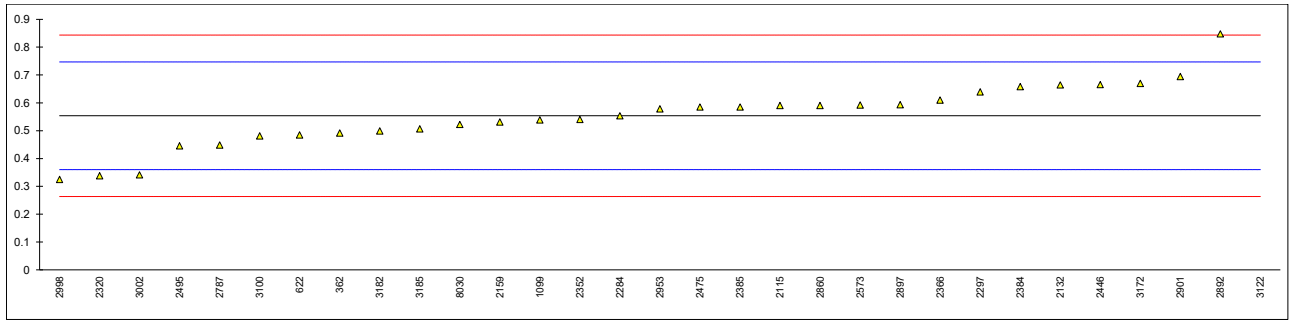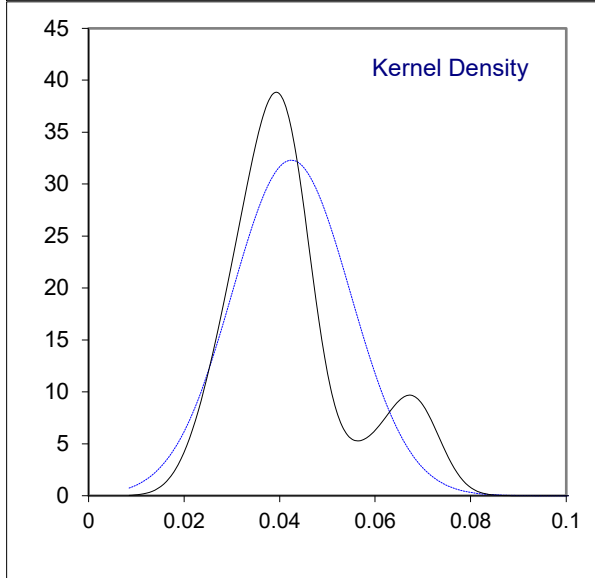| lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.491	C	-0.65	first reported 491 mg/dm2
622	EN13130-1	0.48441		-0.71	
1099		0.5387	E	-0.15	calculation difference, iis calculated: 0.42130
2115	EN13130-1	0.59		0.38	
2132	In house	0.6642		1.14	
2159	EN13130-1	0.53108		-0.23	
2284	EN13130-1	0.553		0.00	
2297	EN13130-1	0.63892		0.88	
2320	EN13130-1	0.338		-2.23	
2352	EN13130-1	0.54		-0.14	
2366	EN13130-1	0.610		0.58	
2384	EN13130-1	0.658		1.08	
2385	EN13130-1	0.585		0.33	
2446	EN13130-1	0.66543		1.16	
2475	EN13130-1	0.5846		0.32	
2495	EN13130-1	0.4454		-1.12	
2573	EN13130-1	0.592	E	0.40	calculation difference, iis calculated: 0.55927
2634		-----		-----	
2689		-----		-----	
2787	In house	0.4480		-1.09	
2860	In house	0.590207		0.38	
2892	EN13130-1	0.847432		3.04	
2897	EN13130-1	0.593		0.41	
2901	EN13130-1	0.694		1.45	
2953	ISO17294-2	0.578		0.25	
2998	In house	0.3248		-2.36	
3002	EN13130-1	0.3409		-2.20	
3100	EN13130-1	0.4806		-0.75	
3122		3.6	ex	31.47	test result excluded, result is reported in mg/kg
3163		-----		-----	
3172	EN13130-1	0.6698		1.20	
3182	EN13130-1	0.499		-0.56	
3185	EN13130-1	0.5065		-0.49	
8030	EN13130-1	0.5223		-0.32	
	normality	OK			
	n	30			
	outliers	0 + 1ex			
	mean (n)	0.5535			
	st.dev. (n)	0.11172	RSD = 20%		
	R(calc.)	0.3128			
	st.dev.(Horwitz)	0.09680			
	R(Horwitz)	0.2710			

Kernel Density
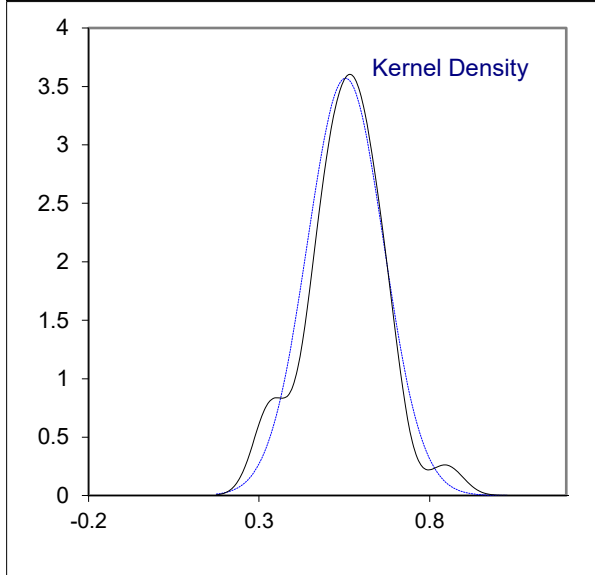
Determination of Specific Migration of Iron as Fe on sample #22721; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.0366	C	-0.53	first reported 36.65 mg/dm2
622	EN13130-1	0.02709		-1.40	
1099		0.0378	E	-0.42	calculation difference, iis calculated: 0.02961
2115		-----		-----	
2132	In house	0.0393		-0.29	
2159	EN13130-1	0.05582		1.23	
2284	EN13130-1	0.043		0.05	
2297	EN13130-1	0.037175		-0.48	
2320	EN13130-1	0.0305		-1.09	
2352	EN13130-1	0.04		-0.22	
2366	EN13130-1	<0.74		-----	
2384	EN13130-1	0.045		0.23	
2385	EN13130-1	0.0417		-0.07	
2446	EN13130-1	0.13867	R(0.01)	8.81	
2475	EN13130-1	0.0691		2.44	
2495	EN13130-1	0.0297		-1.17	
2573	EN13130-1	0.043		0.05	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.0383		-0.38	
2860	In house	0.037252		-0.47	
2892	EN13130-1	0.067889		2.33	
2897	EN13130-1	0.041		-0.13	
2901	EN13130-1	0.063		1.88	
2953	ISO17294-2	0.069		2.43	
2998	In house	0.0242		-1.67	
3002	EN13130-1	0.0336		-0.81	
3100	EN13130-1	0.04328		0.08	
3122		0.3	ex	23.58	test result excluded, result is reported in mg/kg
3163		-----		-----	
3172	EN13130-1	0.0437		0.12	
3182	EN13130-1	0.032	E	-0.96	calculation difference, iis calculated: 0.03774
3185	EN13130-1	0.0433		0.08	
8030	EN13130-1	0.0334		-0.83	

normality	suspect			
n	27			
outliers	1 + 1ex			
mean (n)	0.0424			
st.dev. (n)	0.01235	RSD = 29%		
R(calc.)	0.0346			
st.dev.(Horwitz)	0.01092			
R(Horwitz)	0.0306			
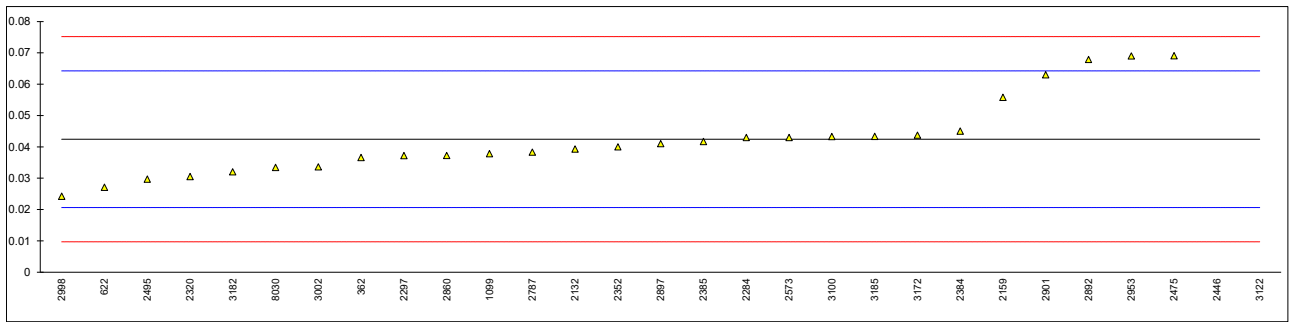
Determination of Specific Migration of Manganese as Mn on sample #22721; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.0028	C	-0.15	first reported 2.795 mg/dm2
622	EN13130-1	0.00339		0.36	
1099		0.0027		-0.24	
2115		-----		-----	
2132	In house	0.00330		0.29	
2159	EN13130-1	0.00199		-0.86	
2284	EN13130-1	<0.01		-----	
2297	EN13130-1	Not detected		-----	
2320	EN13130-1	<0.01		-----	
2352		-----		-----	
2366	EN13130-1	<0.0148		-----	
2384	EN13130-1	0.003		0.02	
2385	EN13130-1	0.0031		0.11	
2446	EN13130-1	0.00439		1.24	
2475	EN13130-1	0.0032		0.20	
2495	EN13130-1	no detected		-----	
2573		-----		-----	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.0019		-0.94	
2860	In house	0.003150		0.15	
2892	EN13130-1	0.004125		1.01	
2897	EN13130-1	not detected		-----	
2901	EN13130-1	0.004		0.90	
2953		-----		-----	
2998	In house	0.00166		-1.15	
3002	EN13130-1	0.0019		-0.94	
3100	EN13130-1	<0.01495		-----	
3122		<0.24		-----	
3163		-----		-----	
3172	EN13130-1	< 0.014		-----	
3182	EN13130-1	Not detected		-----	
3185	EN13130-1	<0.010		-----	
8030	EN13130-1	<0.0145		-----	

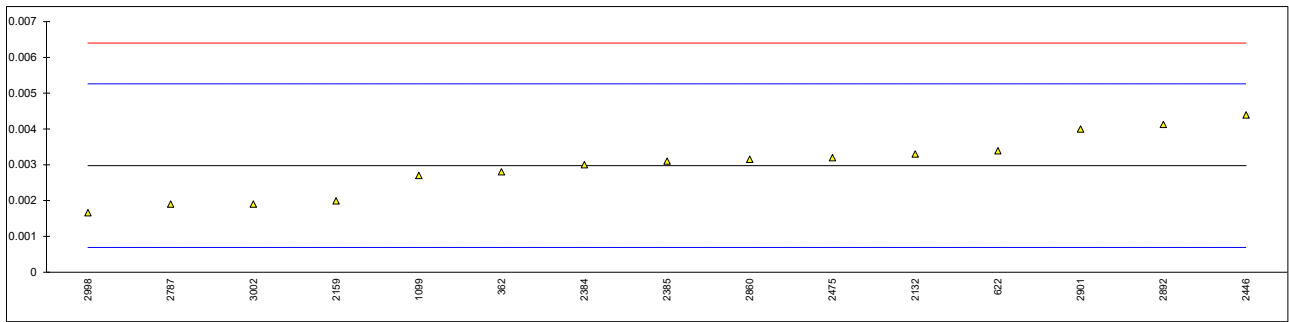|				
	normality	OK		
	n	15		
	outliers	0		
	mean (n)	0.0030		
	st.dev. (n)	0.00084	RSD = 28%	
	R(calc.)	0.0024		
	st.dev.(Horwitz)	0.00114		
	R(Horwitz)	0.0032		
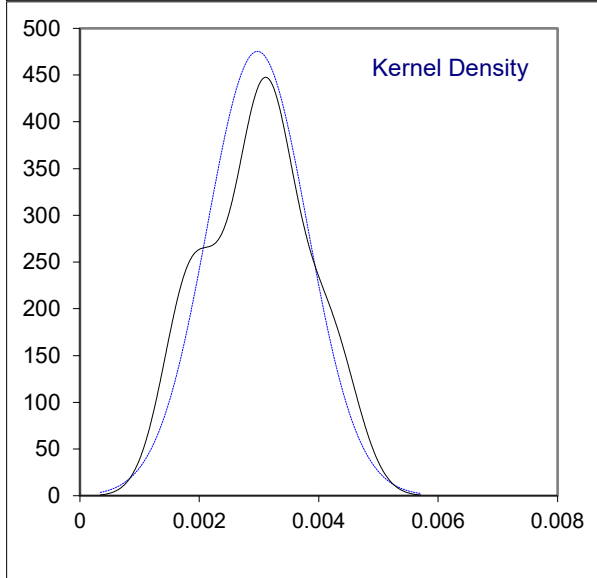
Determination of Specific Migration of Nickel as Ni on sample #22721; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.0014	C	-0.23	first reported 1.398 mg/dm2
622	EN13130-1	0.00157		0.03	
1099		0.0014		-0.23	
2115		-----		-----	
2132	In house	0.00184		0.44	
2159	EN13130-1	0.00104		-0.78	
2284	EN13130-1	0.002		0.69	
2297	EN13130-1	Not detected		-----	
2320	EN13130-1	<0.01		-----	
2352		-----		-----	
2366	EN13130-1	<0.0015		-----	
2384	EN13130-1	0.002		0.69	
2385	EN13130-1	0.0017		0.23	
2446	EN13130-1	0.02773	G(0.01)	39.90	
2475	EN13130-1	0.0019		0.54	
2495	EN13130-1	no detected		-----	
2573		-----		-----	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.0014		-0.23	
2860	In house	0.001597		0.07	
2892	EN13130-1	ND		-----	
2897	EN13130-1	0.00155		0.00	
2901	EN13130-1	0.002		0.69	
2953		-----		-----	
2998	In house	0.00078		-1.17	
3002	EN13130-1	0.00090		-0.99	
3100	EN13130-1	＜0.001495		-----	
3122		<0.02		-----	
3163		-----		-----	
3172	EN13130-1	< 0.014		-----	
3182	EN13130-1	Not detected		-----	
3185	EN13130-1	<0.010		-----	
8030	EN13130-1	0.0017		0.23	

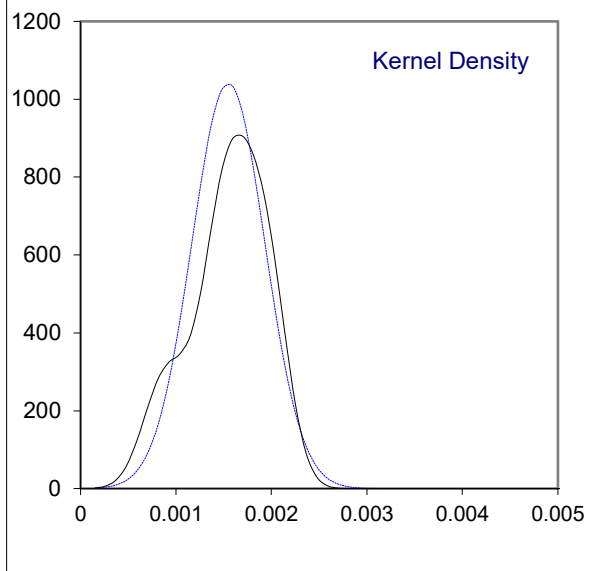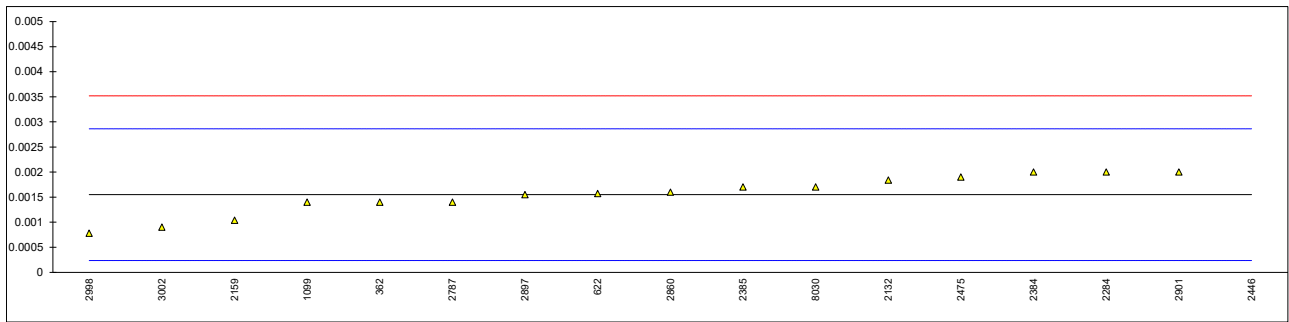|		
normality	OK	
n	16	
outliers	1	
mean (n)	0.00155	
st.dev. (n)	0.000383	RSD = 21%
R(calc.)	0.00107	
st.dev.(Horwitz)	0.000656	
R(Horwitz)	0.00184	

Determination of Specific Migration of Zinc as Zn on sample #22721; results in mg/dm^2 per contact surface

lab	method	value	mark	z(targ)	remarks
310		-----		-----	
339		-----		-----	
362	In house	0.317	C	-0.42	first reported 317 mg/dm2
622	EN13130-1	0.34402		0.00	
1099		0.3196		-0.38	
2115	EN13130-1	0.35		0.10	
2132	In house	0.3922		0.75	
2159	EN13130-1	0.38854		0.69	
2284	EN13130-1	0.348		0.06	
2297	EN13130-1	0.41693		1.13	
2320	EN13130-1	0.217		-1.96	
2352	EN13130-1	0.38		0.56	
2366	EN13130-1	0.413		1.07	
2384	EN13130-1	0.414		1.09	
2385	EN13130-1	0.375		0.48	
2446	EN13130-1	0.43509		1.41	
2475	EN13130-1	0.3322		-0.18	
2495	EN13130-1	0.2638		-1.24	
2573	EN13130-1	0.401		0.88	
2634		-----		-----	
2689		-----		-----	
2787	In house	0.2875		-0.87	
2860	In house	0.370710		0.42	
2892	EN13130-1	0.509303		2.56	
2897	EN13130-1	0.421		1.19	
2901	EN13130-1	0.700	R(0.01)	5.51	
2953	ISO17294-2	0.258		-1.33	
2998	In house	0.2624		-1.26	
3002	EN13130-1	0.2102		-2.07	
3100	EN13130-1	0.2915		-0.81	
3122		2.2	ex	28.73	test result excluded, result is reported in mg/kg
3163		-----		-----	
3172	EN13130-1	0.3819		0.59	
3182	EN13130-1	0.295		-0.76	
3185	EN13130-1	0.2340		-1.70	
8030	EN13130-1	0.3428		-0.02	
	normality	OK			
	n	29			
	outliers	2			
	mean (n)	0.3439			
	st.dev. (n)	0.07196	RSD = 21%		
	R(calc.)	0.2015			
	st.dev.(Horwitz)	0.06461			
	R(Horwitz)	0.1809			
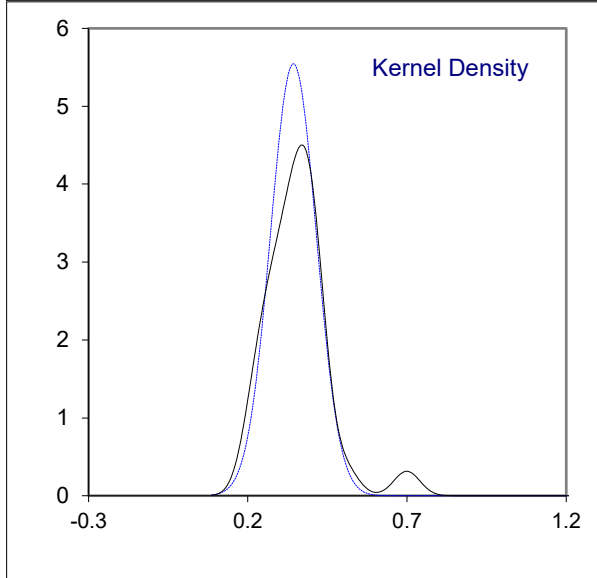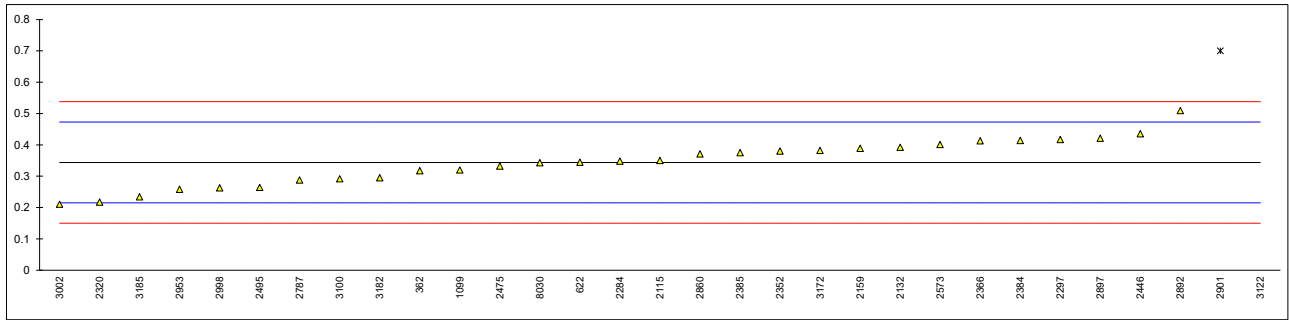
APPENDIX 2

Determination of Specific Migration of other elements on sample #22721; results in mg/dm^2

lab	Aluminum (Al)	Lithium (Li)	remarks
310	-----	-----	
339	-----	-----	
362	0.0059 C	<0.001	first reported for Al: 5.901 mg/dm2
622	0.33739	0.00004	
1099	0.0065	< 0,0007	
2115	-----	-----	
2132	0.0129	0.00000097	
2159	0.01673	not determined	
2284	<0.02	<0.02	
2297	Not detected	Not detected	
2320	<0.01	<0.01	
2352	-----	-----	
2366	<0.0148	<0.0148	
2384	0.008	0.000	
2385	0.0066	<0.001	
2446	0.00914	n.d.	
2475	0.0059	Not detected	
2495	no detected	no detected	
2573	-----	-----	
2634	-----	-----	
2689	-----	-----	
2787	0.0045	not determined	
2860	0.005654	<0.0014	
2892	ND	ND	
2897	not detected	not detected	
2901	<0.01	<0.001	
2953	0.033	-----	
2998	<0,0023548	<0,00029	
3002	0.0049	< 0.00007	
3100	<0.01495	<0.01495	
3122	<0.24	<0.24	
3163	-----	-----	
3172	< 0.014	< 0.014	
3182	Not detected	Not detected	
3185	<0.010	<0.010	
8030	<0.0145	<0.0145	

APPENDIX 3   Details on reported intermediate test results

sample #22720 - surface area, volume of simulant and final concentration reported per step

lab	surface area (dm²)	volume simulant (mL)	Final conc. (mg/L)	surface area (dm²)	volume simulant (mL)	Final conc. (mg/L)	surface area (dm²)	volume simulant (mL)	Final conc. (mg/L)
	1st step			2nd step			3rd step		
310	-----	-----	-----	-----	-----	-----	-----	-----	-----
339	0.6	100	1.98	0.6	100	1.17	0.6	100	1.05
362	2	200	4.68	2	200	3.83	2	200	2.54
622	4.0800	160	1.02535	4.0800	160	0.53431	4.0800	160	0.40058
1099	1.2759	100	10.66507 C	1.2759	100	6.84970 C	1.2759	100	4.16264 C
2115	2.16	200	4.19	2.16	200	3.22	2.16	200	3.21
2132	2.12	353	1.37	2.12	353	0.3320	2.12	353	0.1910
2159	-----	-----	-----	-----	-----	-----	-----	-----	-----
2284	2.12	350	2.732	2.12	350	1.633	2.12	350	1.474
2297	2.19	365	2.425	2.19	365	1.406	2.19	365	0.944
2320	-----	-----	-----	-----	-----	-----	-----	-----	-----
2352	2.2	370	2.20	2.2	370	1.60	2.2	370	1.43
2366	2.18	363	2.46	2.18	363	1.90	2.18	363	1.36
2384	0.3	50	10.1467	0.3	50	5.60	0.3	50	3.3967
2385	0.6	100	3.58	0.6	100	1.92	0.6	100	1.39
2446	-----	-----	-----	-----	-----	-----	-----	-----	-----
2475	-----	-----	-----	-----	-----	-----	-----	-----	-----
2495	2.16	200	4.372	2.16	200	2.789	2.16	200	2.493
2573	2.12	350	2.310	2.12	350	1.329	2.12	350	0.853
2634	-----	-----	-----	-----	-----	-----	-----	-----	-----
2689	2.05	333	0.119	2.05	333	0.174	2.05	333	0.217
2787	2.1168	100	6.461	2.1168	100	4.555	2.1168	100	2.903
2860	1.9012	1000	0.94237	1.9404	1000	0.77979	1.8620	1000	0.29237
2892	2.18697	365	2.76468	2.18697	365	1.81420	2.18697	365	1.49222
2897	-----	-----	-----	-----	-----	-----	-----	-----	-----
2901	2.12	350	2.939	2.12	350	1.942	2.12	350	1.716
2953	2.179	100	3.591	2.179	100	4.632	2.179	100	1.751
2998	-----	-----	-----	-----	-----	-----	-----	-----	-----
3002	1.1	183	3.89	1.1	183	4.15	1.1	183	1.857
3100	2.1168	353	2.61125	2.1168	353	1.63342	2.1168	353	1.34882
3122	1.06	100	2.132	1.06	100	1.321	1.06	100	1.236
3163	1.0	100	0.00	1.0	100	0.00	1.0	100	0.00
3172	2.1182 C	353	0.3918	2.1182 C	353	0.1666	2.1182 C	353	0.0682
3182	2.12	353.33	2.66	2.12	353.33	1.64	2.12	353.33	1.27
3185	2.12	350	2.770	2.12	350	1.930	2.12	350	1.530
8030	0.60	100	2.58	0.60	100	2.41	0.60	100	1.66

lab 1099 first reported for surface area 1st step:4.99920, for surface area 2nd step: 3,21060, for surface area 3rd step: 1.95120
lab 3172 first reported for surface area for all three steps 1.0591
All labs used double surface, except lab 3002 used single surface and lab 3122 did not mention a surface single or double

sample #22721 - surface area, volume of simulant and final concentrations of several elements

lab	surface area (dm²)	volume simulant (mL)	Final conc. (mg/L)				
			Al	Ba	Co	Cu	Fe
310	-----	-----	-----	-----	-----	-----	-----
339	-----	-----	-----	-----	-----	-----	-----
362	1.61	250	0.038	0.098	1.103	3.163	0.236
622	1.79539	210	3.07019	0.12123	1.65731	4.14144	0.23157
1099	1.84	240	< 0,039	0.114	1.04	3.23	0.227
2115	1.58	200	-----	0.142	1.43	4.63	-----
2132	1.60	250	0.0827	0.1382	1.2871	4.2512	0.2512
2159	1.4332	250	0.09566	0.06522	0.99060	3.03782	0.31934
2284	1.59	250	<0.1	0.142	1.255	3.518	0.275
2297	1.73	260	Not det.	Not det.	1.45339	4.25125	0.24736
2320	1.6986	260	0.026	0.105	0.775	2.211	0.199
2352	1.71	240	-----	0.15	1.36	3.83	0.29
2366	1.62	240	<0.1	<0.25	1.428	4.119	<5
2384	1.557	220	0.056	0.137	1.590	4.668	0.322
2385	1.65	230	0.048	0.133	1.40	4.20	0.299
2446	1.21	158	0.06999	0.14162	1.807	5.096	1.062
2475	1.55	230	0.040	0.148	1.250	3.940	0.466
2495	1.43	200	Not det.	0.119	1.276	3.185	0.212
2573	1.65	240	-----	-----	1.336	3.845	0.294
2634	-----	-----	< 0.10	0.094	0.128	1.59	0.077
2689	1.6	200	Not det.	0.158	0.954	3.842	Not det.
2787	1.538	200	0.0344	0.1209	1.231	3.4495	0.295
2860	1.74113	250	0.0393785	0.131145	1.416425	4.110505	0.259445
2892	1.52791	340	ND	0.173783	1.073609	3.808235	0.305082
2897	1.71	254	Not det.	0.1285	1.444	3.992	0.2743
2901	1.66	240	<0.01	0.147	1.820	4.803	0.439
2953	1.881	240	0.261	0.159	1.413	4.491	0.532
2998	2.0384	200	<0,024	0.152	1.197	3.311	0.247
3002	1.7089	260	0.0319	0.0763	0.7665	2.2404	0.2210
3100	1.60442	240	<0.1	0.1694	1.111	3.213	0.2839
3122	1.8	220	0.0000425	0.0000954	0.00116	0.003599	0.0002812
3163	0.6	100	0.00	0.35	2.57	6.59	0.7
3172	1.7594	240	< 0.1	0.14	1.59	4.91	0.32
3182	1.59	240	Not det.	0.17	1.06	3.31	0.25
3185	1.56	245	0.0248	0.1698	0.9009	3.2252	0.2755
8030	1.73	250	<0.100	0.114	1.277	3.614	0.231

sample #22721 - final concentrations of several elements continued

lab	Li	Mn	Ni	Zn
	Final conc. (mg/L)			
310	-----	-----	-----	-----
339	-----	-----	-----	-----
362	<0.001	0.018	0.009	2.041
622	0.00036	0.02900	0.01346	2.94119
1099	< 0,004	0.016	0.009	1.92
2115	-----	-----	-----	2.78
2132	0.00000620	0.0211	0.0118	2.5102
2159	Not det.	0.01140	0.00608	2.22248
2284	<0.1	<0.05	0.012	2.214
2297	Not det.	Not det.	Not det.	2.77419
2320	<0.01	0.011	<0.01	1.415
2352	-----	-----	-----	2.68
2366	<0.1	<0.1	<0.01	2.79
2384	0.000	0.023	0.012	2.933
2385	<0.001	0.021	0.012	2.69
2446	n.d.	0.03361	0.21238	3.332
2475	Not det.	0.021	0.0125	2.239
2495	Not det.	Not det.	Not det.	1.886
2573	-----	-----	-----	2.759
2634	< 0.05	< 0.05	< 0.002	1.11
2689	Not det.	Not det.	Not det.	1.921
2787	not anal	0.0149	0.0108	2.214
2860	<0.010	0.021935	0.011125	2.581815
2892	ND	0.018538	ND	2.288733
2897	Not det.	Not det.	0.0104	2.836
2901	<0.001	0.031	0.016	4.843
2953	-----	-----	-----	1.991
2998	<0,003	0.017	0.008	2.675
3002	< 0.0005	0.0126	0.0059	1.3820
3100	<0.1	<0.1	<0.01	1.949
3122	0.0000001	0.0000197	0.0000102	0.002216
3163	0.02	0.04	0.02	4.77
3172	< 0.1	< 0.1	< 0.1	2.80
3182	Not det.	Not det.	Not det.	1.85
3185	<0.010	0.0120	<0.010	1.4901
8030	<0.100	<0.100	0.012	2.372

APPENDIX 4   Analytical details

Sample #22720

lab	accredited ISO/IEC 17025	sample cleaned prior to the migration step	simulant preheated	Equipment used	Sample sealed during test
310	---	---	---	---	---
339	No	No	Yes	Oven	Yes, wrapped with plastic wrap
362	Yes	Yes	Yes	Incubator	Yes, tested in an airtight container
622	Yes	No	Yes	Oven	No
1099	Yes	No	Yes	---	---
2115	Yes	No	Yes	Incubator	Yes, Covered with glass
2132	Yes	Yes, wipe the test specimen by using a lint-free cloth.	Yes	Oven	Yes, covered with a glass plate and the whole container wrapped with plastic wrap.
2159	---	---	---	---	---
2284	Yes	No	Yes	Oven	Yes, tested in an airtight container
2297	Yes	No	Yes	Oven	Yes, with aluminum seal
2320	---	---	---	---	---
2352	Yes	No	Yes	Oven	Yes, with aluminum seal
2366	Yes	No	Yes	Oven	Yes, tested in an airtight container
2384	Yes	No	Yes	Oven	Yes, tested in an airtight container
2385	Yes	No	Yes	Oven	Yes, with a glas plate
2446	---	---	---	---	---
2475	---	---	---	---	---
2495	Yes	Yes, gently cleaned with soap and cold water	Yes	Oven	Yes, covered with laboratory glass
2573	Yes	No	Yes	Oven	Yes, sealed with food grade plastic wrap
2634	---	---	---	---	---
2689	Yes	Yes	Yes	Oven	Yes, tested in an airtight container
2787	---	---	---	---	---
2860	Yes	No	Yes	Oven	Yes, with aluminum seal
2892	Yes	Yes, cleaned by DI water prior to the migration steps 5	Yes	Oven	Yes, sealed by glass plate
2897	---	---	---	---	---
2901	Yes	No	Yes	Oven	Yes, Plastic Film isent of BPA
2953	No	Yes, mild wash with neutral soap at 30 °C	Yes	Oven	Yes, with aluminum seal
2998	---	---	---	---	---
3002	No	No	No	Oven	Yes, tested in an airtight container
3100	Yes	Yes, Rinse the sample with distilled water and allow to drain	Yes	Oven	Yes, tested in an airtight container
3122	No	No	Yes	Oven	No
3163	No	No	Yes	Oven	Yes, tested in an airtight container
3172	No	No	Yes	Oven	Yes, was sealed with a glass sealing
3182	Yes	No	Yes	Oven	Yes, with aluminum seal
3185	Yes	Yes, Cleaned the sample with distilled water	Yes	Oven	Yes, Sealed with PE film
8030	Yes	No	Yes	Oven	Yes, tested in an airtight container

Sample #22721

lab	accredited ISO/IEC 17025	sample cleaned prior to the migration step	simulant preheated	Equipment used	Sample sealed during test
310	---	---	---	---	---
339	---	---	---	---	---
362	Yes	Yes	Yes	Incubator	Yes, tested in an airtight container
622	Yes	No	Yes	Oven	Yes, with aluminum seal
1099	Yes	No	Yes	---	---
2115	Yes	No	Yes	Incubator	Yes, covered with a glass
2132	Yes	Yes, with a lint-free cloth	Yes	Oven	Yes,covered with a glass plate and the whole container wrapped with plastic wrap.
2159	Yes	No	Yes	Oven	Yes, tested in an airtight container
2284	No	No	Yes	Oven	Yes, tested in an airtight container
2297	Yes	No	Yes	Oven	Yes, with aluminum seal
2320	No	Yes, with De-ionized water	No	Oven	Yes, with glass plate
2352	Yes	No	Yes	Oven	---
2366	Yes	No	Yes	Oven	Yes, tested in an airtight container
2384	Yes	No	Yes	Oven	Yes, with glass dish
2385	Yes	No	Yes	Oven	Yes, vessel was covered with a glass plate
2446	Yes	No	Yes	Oven	---
2475	No	No	Yes	Oven	Yes, with plastic film + aluminum seal
2495	Yes	Yes, gently cleaned with soap and cold water	Yes	Oven	Yes, covered with laboratory glass
2573	Yes	No	Yes	Oven	Yes, sealed with food grade plastic wrap
2634	Yes	No	No	Oven	Yes, watch glass
2689	Yes	Yes	Yes	Oven	Yes, tested in an airtight container
2787	Yes	No	No	Incubator	No
2860	Yes	No	Yes	Oven	Yes, sealed by glass cover
2892	Yes	Yes, DI water	Yes	Oven	Yes, sealed by glass plate
2897	Yes	Yes, cleaned by distilled water	Yes	Oven	Yes, covered with glass seal
2901	Yes	No	Yes	Oven	Yes, sealed with plastic film
2953	Yes	Yes, mild washing with neutral soap at 30 °C	Yes	Oven	Yes, with aluminum seal
2998	Yes	Yes, washing with detergent, then rinsed with mains water and then distilled water	Yes	Oven	Yes, round glass
3002	Yes	No	Yes	Oven	No
3100	Yes	No	Yes	Oven	Yes, tested in an airtight container
3122	Yes	No	Yes	Oven	No
3163	No	No	Yes	Oven	Yes, tested in an airtight container
3172	No	No	Yes	Oven	Yes, sealed with a Watch glass
3182	Yes	No	No	Oven	Yes, with aluminum seal
3185	Yes	Yes, with distilled water	Yes	Oven	Yes, Sealed with PE film.
8030	Yes	No	Yes	Oven	Yes, tested in an airtight container

APPENDIX 5

Number of participants per country

1 lab in	BRAZIL
1 lab in	BULGARIA
2 labs in	FRANCE
2 labs in	GERMANY
1 lab in	HONG KONG
1 lab in	INDONESIA
1 lab in	ISRAEL
7 labs in	ITALY
1 lab in	MALAYSIA
8 labs in	P.R. of CHINA
1 lab in	POLAND
2 labs in	SERBIA
1 lab in	SPAIN
1 lab in	SRI LANKA
2 labs in	THAILAND
2 labs in	THE NETHERLANDS
1 lab in	TURKEY
1 lab in	VIETNAM

APPENDIX 6

Abbreviations

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of the participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?

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