Institute for
Interlaboratory Studies

Results of Proficiency Test
Engine Oil (used)
May 2022

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: Mrs. E.R. Montenij-Bos
Correctors: ing. G.A. Oosterlaken-Buijs & ing. M. Meijer
Approved by: ing. A.S. Noordman-de Neef

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1 INTRODUCTION

Since 1997 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of used Engine Oil (Lubricating Oil) based on the latest version of SAE and ASTM D4485 every year. During the annual proficiency testing program 2021/2022 it was decided to continue the round robin for the analysis of used Engine Oil.

In this interlaboratory study registered for participation:
- 75 laboratories in 46 countries for regular analyzes in used Engine Oil iis22L08
- 69 laboratories in 44 countries on the Metal analyzes iis22L08M

In total 79 laboratories in 46 countries registered for participation in one or more proficiency tests, see appendix 3 for the number of participants per country. In this report the results of this Engine Oil (used) proficiency tests 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 one sample used Engine Oil in a 0.5 L bottle labelled #22086 for regular analyzes and a 50 mL PE bottle labelled #22087 for the analyzes of metals only.
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 preparation of the sample for the regular analyzes in Engine Oil (used) a batch of approximately 60 liters of Engine Oil (used) was obtained from a third-party. After homogenization 105 amber glass bottles of 0.5 L were filled and labelled #22086.
The homogeneity of the subsamples was checked by determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/L
sample #22086-1	0.8953
sample #22086-2	0.8953
sample #22086-3	0.8953
sample #22086-4	0.8953
sample #22086-5	0.8953
sample #22086-6	0.8953
sample #22086-7	0.8953
sample #22086-8	0.8953

Table 1: homogeneity test results of subsamples #22086

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

	Density at 15 °C in kg/L
r (observed)	0.00000
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 2: evaluation of the repeatability of subsamples #22086

The calculated repeatability is in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the sample for the analyzes of Metals in Engine Oil (used) a batch of approximately 5 L of Engine Oil (used) was obtained from a third-party. This batch was made positive with certain wear metals. After homogenization 95 PE bottles of 50 mL were filled and labelled #22087.

The homogeneity of the subsamples was checked by determination of Aluminum and Nickel in accordance with ASTM D5185 on 8 stratified randomly selected subsamples.

	Aluminum in mg/kg	Nickel in mg/kg
sample #22087-1	11.265	13.158
sample #22087-2	11.262	13.273
sample #22087-3	11.190	13.171
sample #22087-4	11.198	13.087
sample #22087-5	10.727	12.998
sample #22087-6	10.954	13.205
sample #22087-7	10.857	12.927
sample #22087-8	10.994	13.197

Table 3: homogeneity test results of subsamples #22087

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

	Aluminum in mg/kg	Nickel in mg/kg
r (observed)	0.57	0.32
reference test method	ASTM D5185:18	ASTM D5185:18
0.3 x R (reference test method)	2.13	0.95

Table 4: evaluation of repeatabilities of subsamples #22087

The calculated repeatabilities are in agreement with 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

Depending on the registration of the participant the appropriate set of PT samples was sent on April 27, 2022. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Engine Oil packed in amber glass bottles and PE bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #22086: Total Acid Number, Base Number ($HClO_4$ and HCl titration), Density at 15 °C, Flash Point PMcc (procedure A and B), Fuel Dilution, Kinematic Viscosity (40 °C and 100 °C), Viscosity Index, Kinematic Viscosity Houillon (40 °C and 100 °C) and Water. Some extra information was asked about the determination of Total Acid Number.

On sample #22087 it was requested to determine: Aluminum as Al, Barium as Ba, Boron as B, Cadmium as Cd, Chromium as Cr, Copper as Cu, Iron as Fe, Lead as Pb, Lithium as Li, Magnesium as Mg, Manganese as Mn, Molybdenum as Mo, Nickel as Ni, Potassium as K, Silicon as Si, Silver as Ag, Sodium as Na, Tin as Sn, Titanium as Ti, Vanadium as V, Calcium as Ca, Phosphorus as P and Zinc as Zn.

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/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal. The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

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

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and original test results are placed under 'Remarks' in the result tables in appendices 1 and 2. Test results that came 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.
For the regular Engine Oil (used) PT eleven participants reported test results after the final reporting date and five other participants were not able to report any test results.
For the Metals in Engine Oil(used) PT nine participants reported test results after the final reporting date and seven other participants were not able to report any test results.
Not all participants were able to report all tests requested.
In total 74 participants reported 1196 numerical test results. Observed were 41 outlying test results, which is 3.4%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 4.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D2270) and an added designation for the year that the test method was adopted or revised (e.g. D2270:10). When a method has been reapproved an “R” will be added and the year of approval (e.g. D2270:10R16).

sample #22086

Total Acid Number: This determination is problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D664-A:18e2 for all end point modes (BEP 60 mL and 125 mL and IP 60 mL and 125 mL).
When evaluated separately for the type of end point the calculated reproducibility is still not in agreement with the requirements of the target reproducibility.

Base Number ($HClO_4$): This determination was problematic. Six statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D2896:21 procedure A forward titration nor with procedure B forward titration.
When the forward titration test results of ASTM D2896 were evaluated separately for procedure A and B the calculated reproducibility is in agreement with the requirements of procedure A of the ASTM D2896:21 forward titration, but not with procedure B.

Base Number (HCl): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D4739:17.

Density at 15 °C: This determination was problematic for a number of laboratories. Five statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO12185:96.

Flash Point PMcc procedure A: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D93-A:20.

Flash Point PMcc procedure B: This determination was very problematic. No statistical outliers were observed. The calculated reproducibility is not at all in agreement with the requirements of ASTM D93-B:20.

Fuel Dilution: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D3524:14R20.

Kinematic Viscosity at 40 °C: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:21e1.

Kinematic Viscosity at 100 °C: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D445:21e1.

Viscosity Index: This determination was 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 requirements of ASTM D2270:10R16.

Kinematic Viscosity Houillon at 40 °C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D7279:20.

Kinematic Viscosity Houillon at 100 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D7279:20.

Water: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D6304:20 procedure B, nor with procedure A and C.

sample #22087

Aluminum as Al: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Boron as B: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:18.

Chromium as Cr: This determination was not problematic. Five statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Copper as Cu: This determination was problematic. No statistical outlier was observed. The calculated reproducibility is not agreement with the requirements of ASTM D5185:18.

Iron as Fe: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D5185:18.

Lead as Pb: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5185:18.

Magnesium as Mg: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D5185:18.

Molybdenum as Mo: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D5185:18.

Nickel as Ni: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

Silicon as Si: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

Sodium as Na: This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D5185:18.

Calcium as Ca: This determination was problematic for a number of laboratories. Six statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D5185:18.

Phosphorus as P: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D5185:18.

Zinc as Zn: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D5185:18.

The majority of the participants agreed on a concentration near or below the limit of detection for all other elements mentioned in paragraph 2.6. Therefore, no z-scores are calculated. The test results of these elements are given in appendix 2.

As used Engine Oil is a complex matrix to analyze, strict adherence to the test methods with regards to sample preparation is advised. Improper sample preparation may be the cause of disagreement of the calculated reproducibility with the requirements of the reference test method. Also, one should be aware that for each element spectral interferences may occur, and differences may occur in uptake rates between test specimen and standard solutions through viscosity effects.

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.

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Acid Number	mg KOH/g	39	4.51	3.49	2.41
Base Number ($HClO_4$)	mg KOH/g	39	9.67	0.79	0.68
Base Number (HCl)	mg KOH/g	10	7.56	1.42	3.96
Density at 15 °C	kg/L	43	0.8950	0.0004	0.0005
Flash Point PMcc procedure A	°C	37	213.0	11.5	15.1
Flash Point PMcc procedure B	°C	14	200.8	22.5	10
Fuel Dilution	%M/M	9	1.0	2.2	1.6
Kinematic Viscosity at 40 °C	mm^2/s	52	117.56	1.84	2.18
Kinematic Viscosity at 100 °C	mm^2/s	53	13.780	0.217	0.156
Viscosity Index		44	115.2	2.8	2
Kin.Viscosity Houillon at 40 °C	mm^2/s	13	117.48	2.20	3.52
Kin. Viscosity Houillon at 100 °C	mm^2/s	15	13.826	0.414	0.774
Water	mg/kg	47	232	320	218

Table 5: reproducibilities of tests on sample #22086

Element	unit	n	average	2.8 * sd	R(lit)
Aluminum as Al	mg/kg	55	11.8	4.8	7.2
Boron as B	mg/kg	39	42.7	14.8	13.5
Chromium as Cr	mg/kg	53	10.2	2.3	3.3
Copper as Cu	mg/kg	60	9.5	3.6	2.3
Iron as Fe	mg/kg	59	11.8	3.8	3.8
Lead as Pb	mg/kg	58	11.5	5.4	7.2
Magnesium as Mg	mg/kg	55	26.2	9.0	8.9
Molybdenum as Mo	mg/kg	53	40.1	11.0	8.8
Nickel as Ni	mg/kg	57	13.2	4.8	5.4
Silicon as Si	mg/kg	53	17.9	6.5	8.9
Sodium as Na	mg/kg	40	3.7	5.2	2.8
Calcium as Ca	mg/kg	49	3741	398	662

Element	unit	n	average	2.8 * sd	R(lit)
Phosphorus as P	mg/kg	51	970	163	134
Zinc as Zn	mg/kg	57	1116	154	187

Table 6: reproducibilities of tests on sample #22087

Without further statistical calculations it can be concluded that for many tests there is a good compliance of the group of participants with the reference test methods. The problematic tests have been discussed in paragraph 4.1.

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

	May 2022	June 2021	June 2020	June 2019	June 2018
Number of reporting laboratories	74	80	69	78	75
Number of test results	1196	1737	1583	1545	1689
Number of statistical outliers	41	68	46	89	63
Percentage of statistical outliers	3.4%	3.9%	2.9%	5.8%	3.7%

Table 7: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared to the requirements of the reference test methods. The conclusions are given in the following table.

Parameter	May 2022	June 2021	June 2020	June 2019	June 2018
Total Acid Number	-	+/-	+/-	+/-	-
Base Number ($HClO_4$)	-	-	-	--	+/-
Base Number (HCl)	++	++	++	++	++
Density at 15 °C	+	+	+/-	-	+/-
Flash Point PMcc procedure A	+	+	-	-	+
Flash Point PMcc procedure B	--	--	+/-	--	--
Fuel Dilution	-	+	+/-	-	-
Kinematic Viscosity at 40 °C	+	+	+	+	+
Kinematic Viscosity at 100 °C	-	-	-	-	-
Viscosity Index	-	-	-	-	-
Kin. Viscosity Houillon at 40 °C	+	++	++	++	++
Kin. Viscosity Houillon at 100 °C	+	++	++	++	++
Water	-	(--)	+	+	+
Metals	+	+	+	+	+

Table 8: comparison determinations to the reference test methods

For results between brackets no z-scores are calculated.

The following performance categories were used:

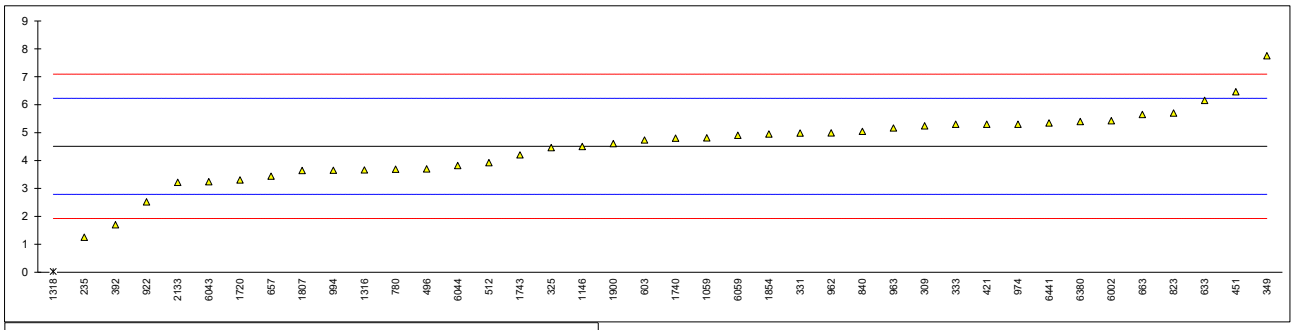
++ : group performed much better than the reference test method
+ : group performed better than the reference test method
+/- : group performance equals the reference test method
- : group performed worse than the reference test method
-- : group performed much worse than the reference test method
n.e. : not evaluated

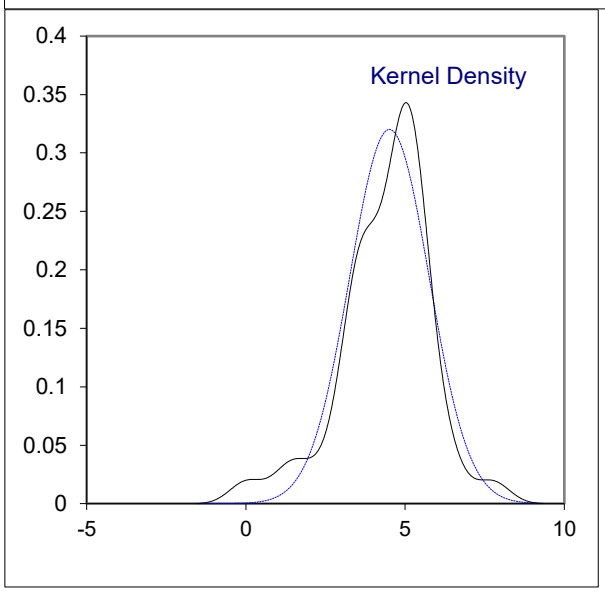
APPENDIX 1

Determination of Total Acid Number on sample #22086; results in mg KOH/g

lab	method	value	mark	z(targ)	end point determination	titration volume
178		-----		-----	---	---
179		-----		-----	---	---
211		-----		-----	---	---
214		-----		-----	---	---
225		-----		-----	---	---
235	D664-A	1.25		-3.79	Buffer End Point pH 10	125 mL
237		-----		-----	---	---
254		-----		-----	---	---
256		-----		-----	---	---
257		-----		-----	---	---
309	D664-A	5.24		0.85	---	---
311		-----		-----	---	---
325	D664-A	4.46		-0.06	Buffer End Point pH 10	125 mL
331	D664Mod.	4.98		0.55	---	---
333	D664-A	5.3		0.92	Inflection Point	125 mL
349	D664-A	7.75		3.77	Buffer End Point pH 10	125 mL
381		-----		-----	---	---
392	INH-173	1.6970		-3.27	---	---
421	ISO6619	5.3		0.92	---	---
451	D664-A	6.46		2.27	Buffer End Point pH 10	60 mL
496	D664-A	3.70		-0.94	Buffer End Point pH 10	60 mL
512	D974	3.92		-0.68	---	---
542		-----		-----	---	---
562		-----		-----	---	---
603	D664-A	4.7332		0.26	Inflection Point	125 mL
614		-----		-----	---	---
633	D664-A	6.1529		1.91	Inflection Point	125 mL
634		-----		-----	---	---
657	D664-A	3.437		-1.25	Inflection Point	60 mL
663	D664-A	5.646		1.32	---	---
780	D664-A	3.69		-0.95	Buffer End Point pH 10	60 mL
823	D664-A	5.7		1.38	Inflection Point	125 mL
840	D664-B	5.04		0.62	Buffer End Point pH 10	60 mL
862		-----		-----	---	---
863		-----		-----	---	---
864		-----		-----	---	---
875		-----		-----	---	---
901		-----		-----	---	---
912		-----		-----	---	---
922	D664-A	2.52		-2.31	Inflection Point	125 mL
962	D664-A	4.99		0.56	---	---
963	D664-B	5.16		0.76	Inflection Point	60 mL
974	D664-A	5.3		0.92	Inflection Point	125 mL
994	D664-A	3.65		-1.00	Inflection Point	60 mL
1023		-----		-----	---	---
1059	ISO6619	4.81		0.35	Buffer End Point pH 11	60 mL
1146	D664	4.497		-0.01	Buffer End Point pH 10	60 mL
1173		-----		-----	---	---
1316	D664-A	3.66		-0.99	Buffer End Point pH 10	60 mL
1318	D664-A	0.025	R(0.05)	-5.21	Inflection Point	60 mL
1435		-----		-----	---	---
1495		-----		-----	---	---
1648		-----		-----	Buffer End Point pH 10	60 mL
1720	D664-A	3.30		-1.41	---	---
1740	D664-A	4.80		0.34	Inflection Point	60 mL
1743	D664-A	4.2		-0.36	Buffer End Point pH 11	60 mL
1761		-----		-----	---	---
1807	D664-A	3.64		-1.01	---	---
1850		-----		-----	---	---
1854		4.95		0.51	Inflection Point	125 mL
1900	D664-A	4.60		0.11	Inflection Point	60 mL
2133	D664-A	3.2163		-1.50	Buffer End Point pH 10	60 mL
6002	D664-A	5.424		1.06	Inflection Point	60 mL
6016		-----		-----	---	---
6043	D664-A	3.24		-1.48	---	---
6044	D664-A	3.818		-0.80	Inflection Point	60 mL
6059	D664-A	4.90		0.45	Inflection Point	60 mL
6257		-----		-----	---	---
6307		-----		-----	---	---
6380	D664-A	5.3982		1.03	Inflection Point	60 mL
6402		-----		-----	---	---
6414		-----		-----	---	---
6441	D664-A	5.34		0.97	---	---
6462		-----		-----	---	---
6464		-----		-----	---	---

			Buffer End Point only	Inflection Point only
	normality	suspect	suspect	OK
	n	39	13	17
	outliers	1	0	1
	mean (n)	4.509	4.310	4.655
	st.dev. (n)	1.2464	1.5829	0.9789
	R(calc.)	3.490	4.432	2.741
	st.dev.(D664-A:18e2 BEP, 60 mL)	0.8606	0.8235	-----
	R(D664-A:18e2 BEP, 60 mL)	2.410	2.306	-----
Compare				
	R(D664-A:18e2 BEP, 125 mL)	1.539	1.468	-----
	R(D664-A:18e2 IP, 60 mL)	1.383	-----	1.419
	R(D664-A:18e2 IP, 125 mL)	1.053	-----	1.088

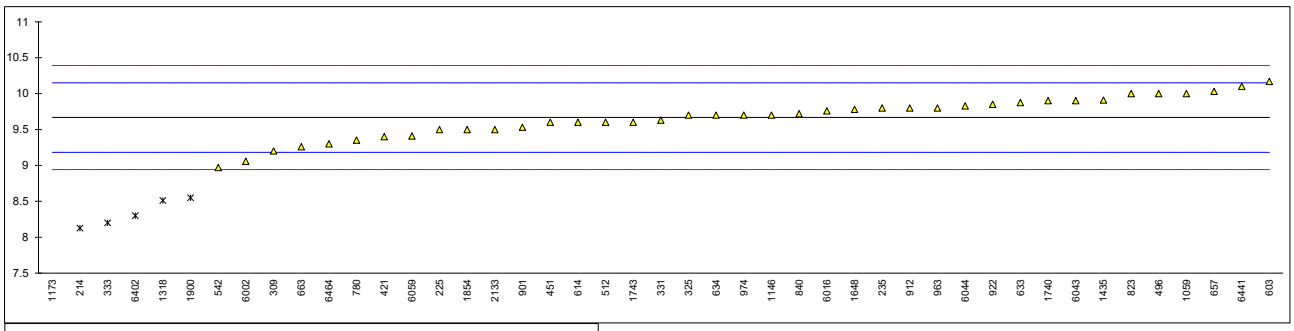


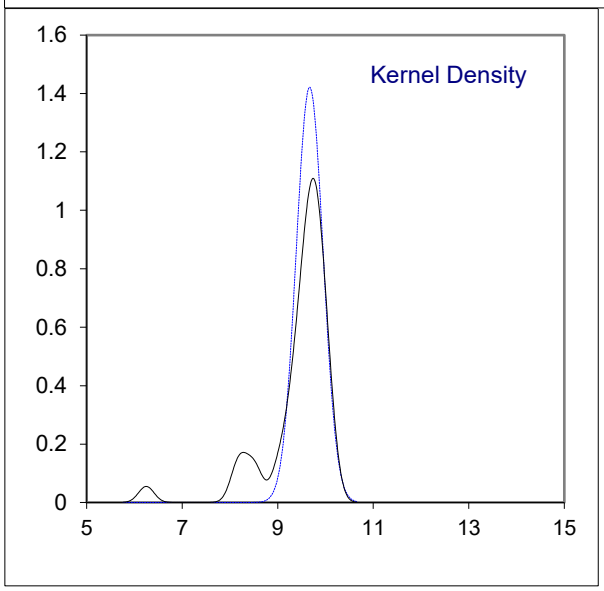


Determination of Base Number ($HClO_4$ titration) on sample #22086; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214	D2896	8.126	R(0.05)	-6.38	
225	D2896-B	9.5		-0.69	
235	D2896-A forward	9.8		0.55	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D2896-A forward	9.20		-1.93	
311		-----		-----	
325	D2896-B forward	9.7		0.13	
331	D2896Mod.	9.63	C	-0.16	first reported 7.83
333	D4739	8.2	R(0.05)	-6.07	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421	ISO3771	9.4		-1.11	
451	D2896	9.6		-0.28	
496	D2896-B back	10.00		1.38	
512		9.60		-0.28	
542	D2896-B forward	8.97		-2.89	
562		-----		-----	
603	D2896-A forward	10.1692		2.08	
614	D2896-A forward	9.6		-0.28	
633	D2896-A forward	9.875		0.86	
634	D2896-A forward	9.7		0.13	
657	D2896-B back	10.03		1.50	
663	D2896	9.26		-1.69	
780	D2896-B forward	9.35		-1.31	
823	D2896-A back	10	C	1.38	first reported 11
840	D2896-B forward	9.72		0.22	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D2896-B forward	9.53		-0.57	
912	D2896	9.8		0.55	
922	D2896-B forward	9.85		0.76	
962		-----		-----	
963	D2896-A forward	9.80		0.55	
974	D2896-A forward	9.7		0.13	
994		-----		-----	
1023		-----		-----	
1059	ISO3771	10.0		1.38	
1146	D2896-A forward	9.7		0.13	
1173	In house	6.25	R(0.01)	-14.14	
1316		-----		-----	
1318	D2896-B forward	8.51	R(0.05)	-4.79	
1435	D2896	9.91		1.00	
1495		-----		-----	
1648	D2896-A back	9.78		0.47	
1720		-----		-----	
1740	D2896-B forward	9.90		0.96	
1743	D2896-B forward	9.6		-0.28	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854	D2896-B back	9.5		-0.69	
1900	In house	8.55	R(0.05)	-4.62	
2133	D2896-B forward	9.500		-0.69	
6002	ISO3771	9.057		-2.53	
6016	D2896-B forward	9.76		0.38	
6043	D2896-A forward	9.9		0.96	
6044	D2896-A back	9.83		0.67	
6059	D2896-A forward	9.41		-1.07	
6257		-----		-----	
6307		-----		-----	
6380		-----		-----	
6402	D4739	8.3	C,R(0.05)	-5.66	first reported 7.1
6414		-----		-----	
6441	D2896-A forward	10.1		1.79	
6462		-----		-----	
6464	D2896-B forward	9.30		-1.52	

		Only procedure A forward	Only procedure B forward
normality	OK	suspect	not OK
n	39	15	15
outliers	6	0	1
mean (n)	9.667	9.771	9.614
st.dev. (n)	0.2806	0.2468	0.2839
R(calc.)	0.786	0.691	0.795
st.dev.(D2896-A:21 forward)	0.2417	0.2443	-----
R(D2896-A:21 forward)	0.677	0.684	-----
Compare			
R(D2896-B:21 forward)	0.677	-----	0.673

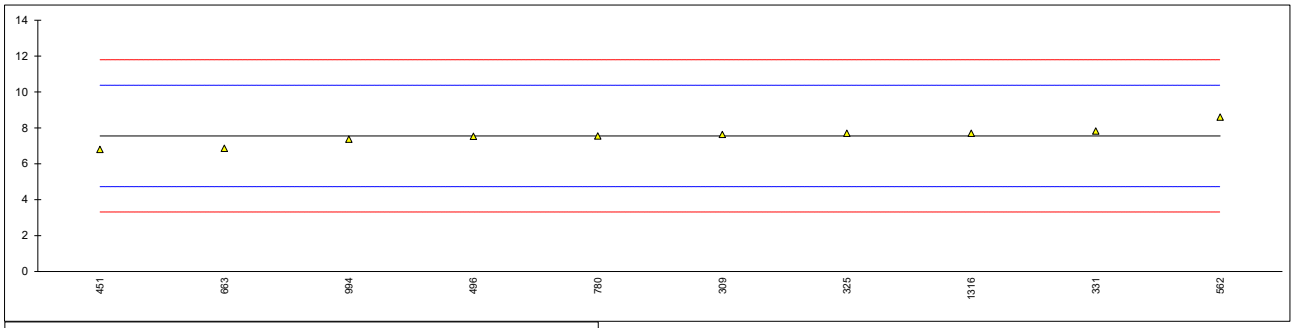


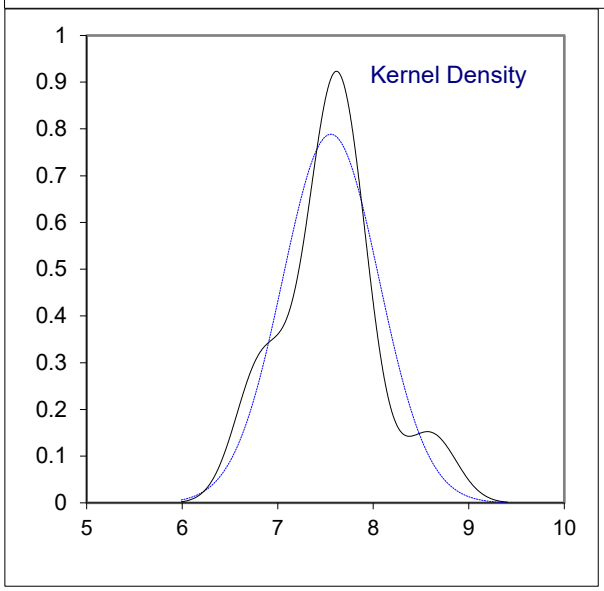


Determination of Base Number (HCl titration) on sample #22086; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D4739	7.63		0.05	
311		-----		-----	
325	D4739	7.7		0.10	
331	D4739Mod.	7.83	C	0.19	first reported 9.63
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451	D4739	6.8		-0.54	
496	D4739	7.53		-0.02	
512		-----		-----	
542		-----		-----	
562	D4739	8.6		0.74	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D4739	6.86		-0.49	
780	D4739	7.55		0.00	
823		-----		-----	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D4739	7.37		-0.13	
1023		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1316	D4739	7.7		0.10	
1318		-----		-----	
1435		-----		-----	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740		-----		-----	
1743		-----		-----	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6257		-----		-----	
6307		-----		-----	
6380		-----		-----	
6402		-----		-----	
6414		-----		-----	
6441		-----		-----	
6462		-----		-----	
6464		-----		-----	

normality	suspect
n	10
outliers	0
mean (n)	7.557
st.dev. (n)	0.5059
R(calc.)	1.416
st.dev.(D4739:17)	1.4137
R(D4739:17)	3.958

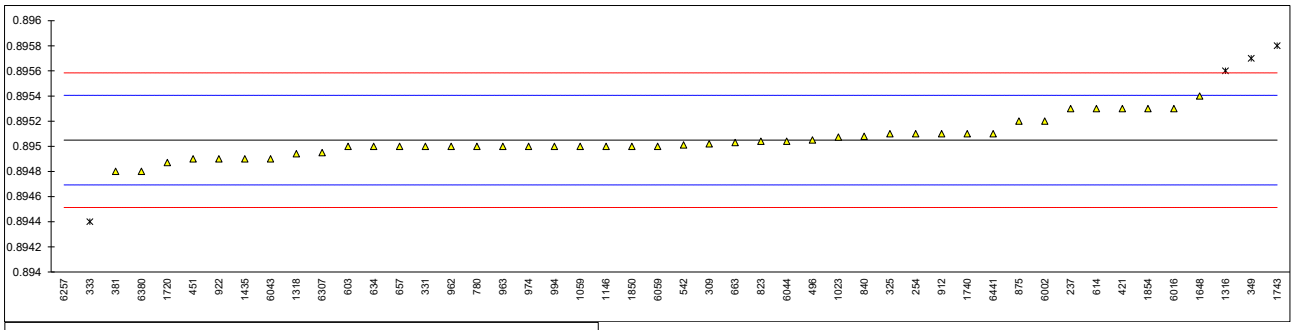


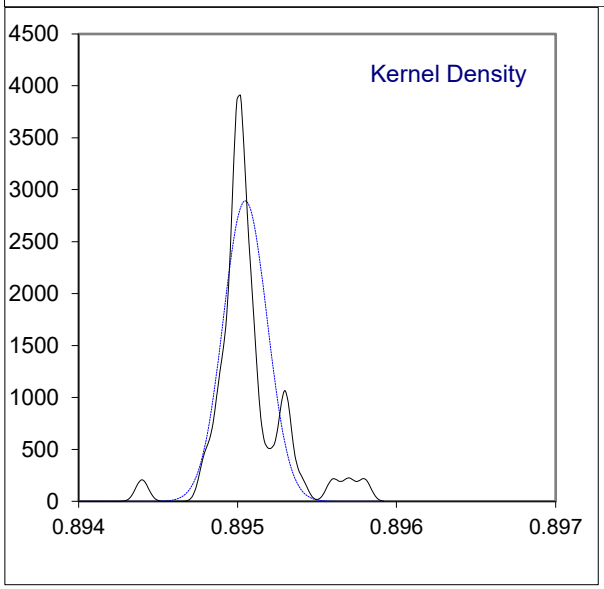


Determination of Density at 15 °C on sample #22086; results in kg/L

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237	D4052	0.8953		1.40	
254	D4052	0.8951		0.28	
256		-----		-----	
257		-----		-----	
309	D4052	0.89502		-0.16	
311		-----		-----	
325	D4052	0.8951		0.28	
331	ISO12185	0.895		-0.28	
333	D4052	0.8944	R(0.01)	-3.64	
349	D4052	0.8957	R(0.01)	3.64	
381	ISO12185	0.8948		-1.40	
392		-----		-----	
421	ISO12185	0.8953	C	1.40	first reported 895.6 kg/m³
451	D4052	0.8949		-0.84	
496	ISO12185	0.89505		0.00	
512		-----		-----	
542	D7042	0.89501		-0.22	
562		-----		-----	
603	D4052	0.89500		-0.28	
614	D4052	0.8953		1.40	
633		-----		-----	
634	D4052	0.8950		-0.28	
657	D4052	0.8950	C	-0.28	first reported 0.89394
663	D4052	0.89503		-0.11	
780	ISO12185	0.8950		-0.28	
823	ISO12185	0.89504		-0.05	
840	D4052	0.89508		0.17	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	ISO12185	0.8952		0.84	
901		-----		-----	
912	ISO12185	0.8951		0.28	
922	D4052	0.8949		-0.84	
962	D4052	0.8950		-0.28	
963	D4052	0.8950		-0.28	
974	D4052	0.8950		-0.28	
994	ISO12185	0.8950		-0.28	
1023	D4052	0.895073		0.13	
1059	ISO12185	0.8950		-0.28	
1146	D4052	0.8950		-0.28	
1173		-----		-----	
1316	D4052	0.8956	R(0.01)	3.08	
1318	D7042	0.89494		-0.61	
1435	D4052	0.8949		-0.84	
1495		-----		-----	
1648	D4052	0.8954		1.96	
1720	D4052	0.89487	C	-1.00	first reported 0.8979
1740	ISO12185	0.8951		0.28	
1743	ISO12185	0.8958	R(0.01)	4.20	
1761		-----		-----	
1807		-----		-----	
1850	D4052	0.8950		-0.28	
1854	D4052	0.8953		1.40	
1900		-----		-----	
2133		-----		-----	
6002	ISO12185	0.8952		0.84	
6016	D4052	0.8953		1.40	
6043	D4052	0.8949		-0.84	
6044	D4052	0.89504		-0.05	
6059	D4052	0.8950		-0.28	
6257	ISO12185	0.89057	C,R(0.01)	-25.08	first reported 894.45 kg/m³
6307	IP365	0.89495		-0.56	
6380	D4052	0.8948		-1.40	
6402		-----		-----	
6414		-----		-----	
6441	D7042	0.8951	C	0.28	first reported 0.8963
6462		-----		-----	
6464		-----		-----	

normality	OK
n	43
outliers	5
mean (n)	0.89505
st.dev. (n)	0.000138
R(calc.)	0.00039
st.dev.(ISO12185:96)	0.000179
R(ISO12185:96)	0.0005

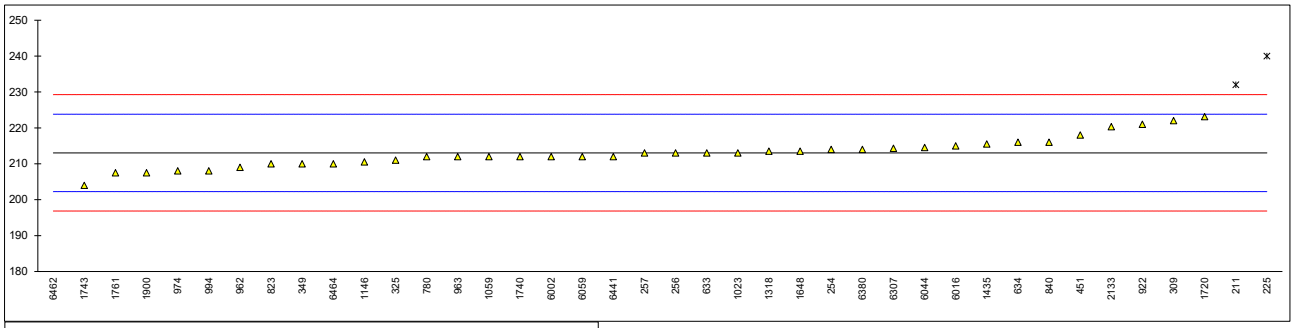


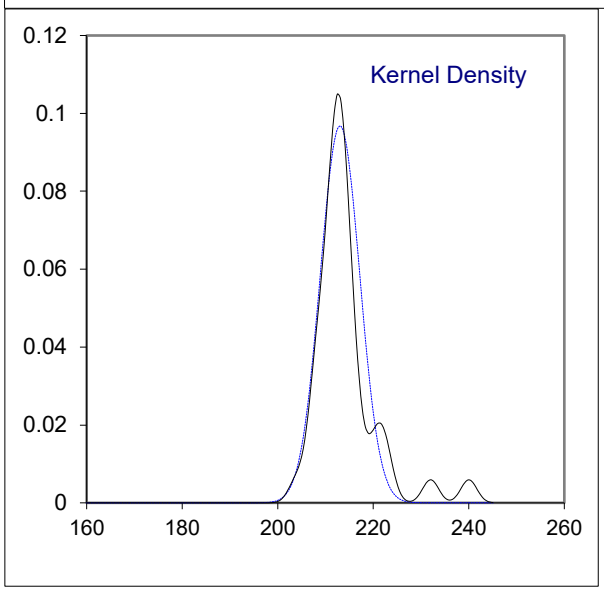


Determination of Flash Point PMcc procedure A on sample #22086; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211	D93-A	232	R(0.01)	3.51	
214		-----		-----	
225	D92	240.0	R(0.01)	4.99	
235	D93-A	>200		-----	
237		-----		-----	
254	D93-A	214		0.18	
256	D93-A	213.0		-0.01	
257	D3828	213		-0.01	
309	D93-A	222.0		1.66	
311		-----		-----	
325	D93-A	211		-0.38	
331		-----		-----	
333		-----		-----	
349	D93-A	210		-0.56	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451	D93-A	218		0.92	
496		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633	D93-A	213		-0.01	
634	D93-A	216.0		0.55	
657		-----		-----	
663		-----		-----	
780	D93-A	212.0		-0.19	
823	ISO2719-A	210.0		-0.56	
840	D3828	216.0		0.55	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922	D93-A	221		1.47	
962	D93-A	209.0		-0.75	
963	D93-A	212.0		-0.19	
974	D93-A	208.0		-0.93	
994	D93-A	208.0		-0.93	
1023	D93-A	213.0		-0.01	
1059	ISO2719-A	212.0		-0.19	
1146	D93-A	210.5		-0.47	
1173		-----		-----	
1316		-----		-----	
1318	D93-A	213.5		0.09	
1435	D93-A	215.5		0.46	
1495		-----		-----	
1648	D93-A	213.5		0.09	
1720	D93-A	223.1	C	1.86	first reported 240.8
1740	D93-A	212		-0.19	
1743	ISO2719-A	204.0		-1.67	
1761	ISO2719-A	207.5		-1.02	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D7094	207.50		-1.02	
2133	D93-A	220.3		1.35	
6002	ISO2719-A	212.0		-0.19	
6016	D93-A	215		0.36	
6043		-----		-----	
6044	D93-A	214.5		0.27	
6059	D93-A	212		-0.19	
6257		-----		-----	
6307	IP523	214.325		0.24	
6380	D93-A	214.0		0.18	
6402		-----		-----	
6414		-----		-----	
6441	D93-A	212.0		-0.19	
6462	ISO3679	84	R(0.01)	-23.89	
6464	D3828	210		-0.56	

normality	OK
n	37
outliers	3
mean (n)	213.033
st.dev. (n)	4.1223
R(calc.)	11.542
st.dev.(D93-A:20)	5.4019
R(D93-A:20)	15.125

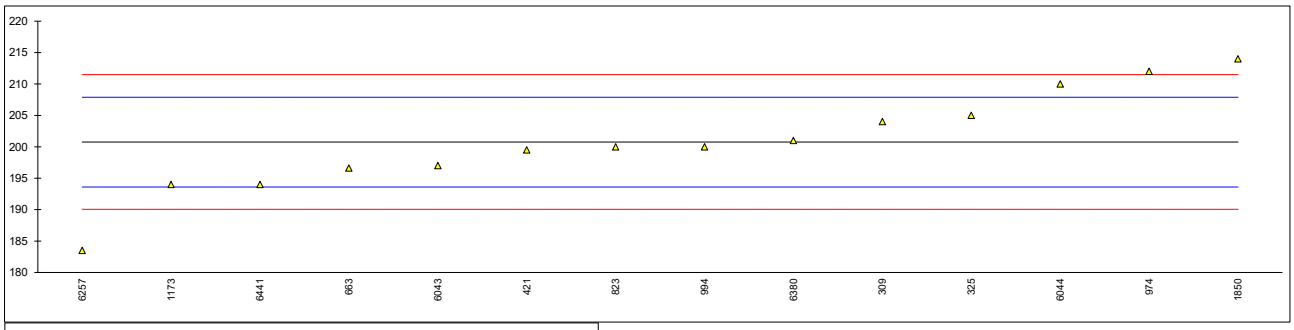


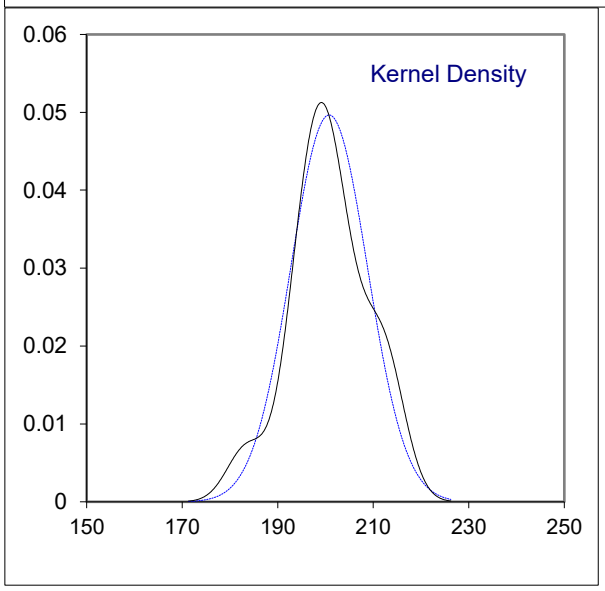


Determination of Flash Point PMcc procedure B on sample #22086; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D93-B	204.0		0.91	
311		-----		-----	
325	D93-B	205		1.19	
331		-----		-----	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421	ISO2719-B	199.5		-0.35	
451		-----		-----	
496		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D93-B	196.6		-1.16	
780		-----		-----	
823	ISO2719-B	200.0		-0.21	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974	D93-B	212.0		3.15	
994	D93-B	200.0		-0.21	
1023		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173	D93-B	194.0		-1.89	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740		-----		-----	
1743		-----		-----	
1761		-----		-----	
1807		-----		-----	
1850	ISO2719-B	214		3.71	
1854		-----		-----	
1900		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043	D93-B	197		-1.05	
6044	D93-B	210		2.59	
6059		-----		-----	
6257	ISO2719-B	183.5		-4.83	
6307		-----		-----	
6380	D93-B	201.0		0.07	
6402		-----		-----	
6414		-----		-----	
6441	D93-B	194.0		-1.89	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	14
outliers	0
mean (n)	200.757
st.dev. (n)	8.0337
R(calc.)	22.494
st.dev.(D93-B:20)	3.5714
R(D93-B:20)	10

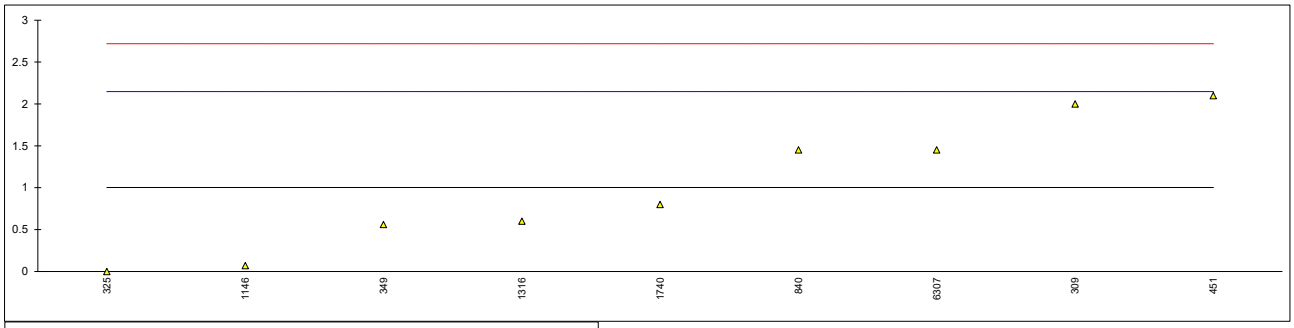


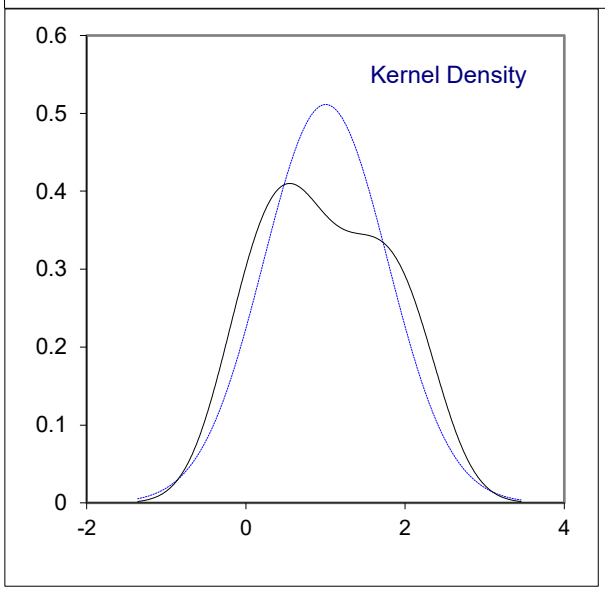


Determination of Fuel Dilution on sample #22086; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D3524	2.0		1.74	
311		-----		-----	
325	D3524	0.0		-1.76	
331	INH-26	<0.4		-----	
333		-----		-----	
349	D3524	0.56		-0.78	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451	D3524	2.1		1.92	
496		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840	D3524	1.45		0.78	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901		-----		-----	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1059		-----		-----	
1146	D3524	0.07		-1.63	
1173		-----		-----	
1316	D3524	0.6		-0.71	
1318		-----		-----	
1435		-----		-----	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740	D3524	0.8		-0.36	
1743		-----		-----	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6257		-----		-----	
6307	D7593	1.450		0.78	
6380		-----		-----	
6402		-----		-----	
6414		-----		-----	
6441	D3524	< 1		-----	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	9
outliers	0
mean (n)	1.003
st.dev. (n)	0.7805
R(calc.)	2.185
st.dev.(D3524:14R20)	0.5714
R(D3524:14R20)	1.6

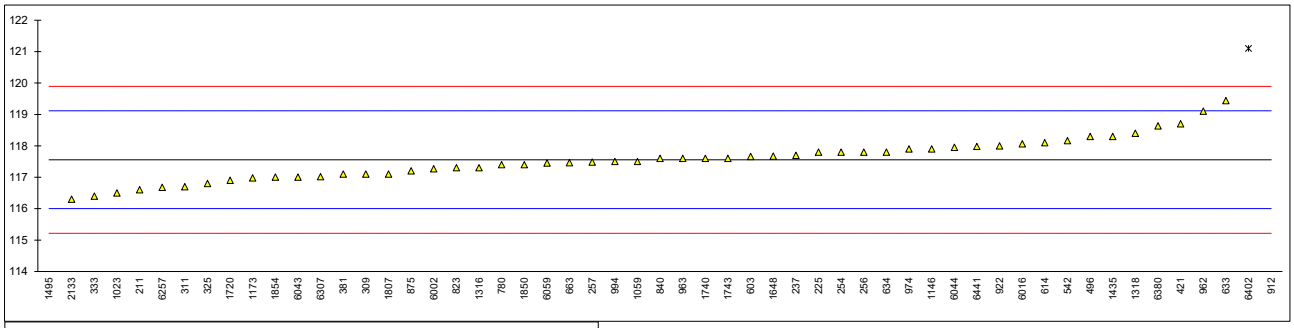


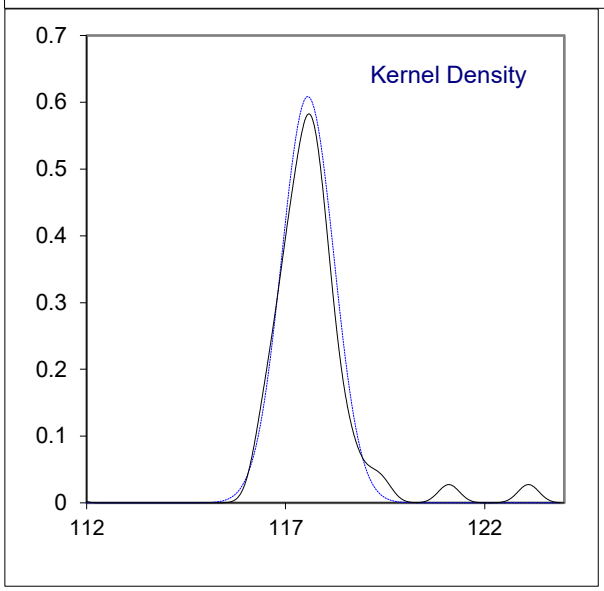


Determination of Kinematic Viscosity at 40 °C on sample #22086; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211	D445	116.6		-1.23	
214		-----		-----	
225	D445	117.8		0.31	
235		-----		-----	
237	D445	117.7		0.18	
254	D445	117.8		0.31	
256	D445	117.8		0.31	
257	D7279 corr. to D445	117.48		-0.10	
309	D445	117.1		-0.59	
311	D445	116.7		-1.10	
325	D445	116.8		-0.97	
331		-----		-----	
333	D445	116.4		-1.49	
349		-----		-----	
381	D445	117.1	C	-0.59	first reported 13.63
392		-----		-----	
421	ISO3104	118.7		1.47	
451		-----		-----	
496	D7042	118.30		0.95	
512		-----		-----	
542	D7042	118.165		0.78	
562		-----		-----	
603	D7042	117.66		0.13	
614	D7042	118.1		0.70	
633	D445	119.44		2.42	
634	D445	117.8		0.31	
657		-----		-----	
663	D445	117.46		-0.13	
780	D445	117.4		-0.20	
823	D445	117.3		-0.33	
840	D445	117.60		0.05	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D445	117.2		-0.46	
901		-----		-----	
912	D445	123.1	R(0.01)	7.11	
922	D445	118.0		0.57	
962	D445	119.1		1.98	
963	D445	117.6		0.05	
974	D445	117.9		0.44	
994	D7042	117.5		-0.07	
1023	D445	116.5		-1.36	
1059	ISO3104	117.5		-0.07	
1146	D445	117.9		0.44	
1173	D445	116.98		-0.74	
1316	ISO3104	117.3		-0.33	
1318	D7042	118.40		1.08	
1435	D7042	118.3		0.95	
1495	ISO3104	111.4	R(0.01)	-7.90	
1648	D445	117.67		0.14	
1720	D7042	116.9		-0.84	
1740	D445	117.6		0.05	
1743	D445	117.6		0.05	
1761		-----		-----	
1807	D445	117.1		-0.59	
1850	ISO3104	117.4		-0.20	
1854	D445	117.0		-0.72	
1900		-----		-----	
2133	D445	116.3		-1.61	
6002	ISO3104	117.27		-0.37	
6016	D7042	118.060		0.64	
6043	D445	117		-0.72	
6044	D7042	117.95		0.50	
6059	D445	117.45		-0.14	
6257	ISO3104	116.68		-1.13	
6307	IP71	117.018		-0.69	
6380	D445	118.631		1.38	
6402	D445	121.1	C,R(0.01)	4.55	first reported 120.6
6414		-----		-----	
6441	D7042	117.98		0.54	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	52
outliers	3
mean (n)	117.558
st.dev. (n)	0.6557
R(calc.)	1.836
st.dev.(D445:21e1)	0.7791
R(D445:21e1)	2.182

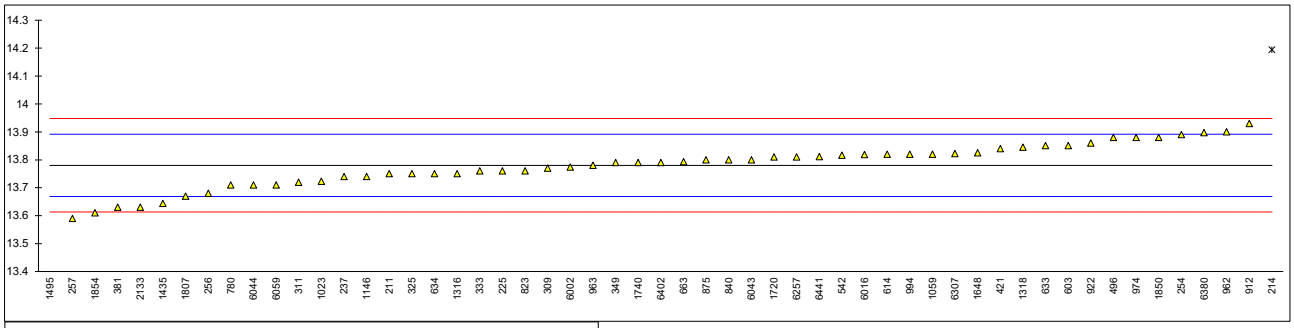


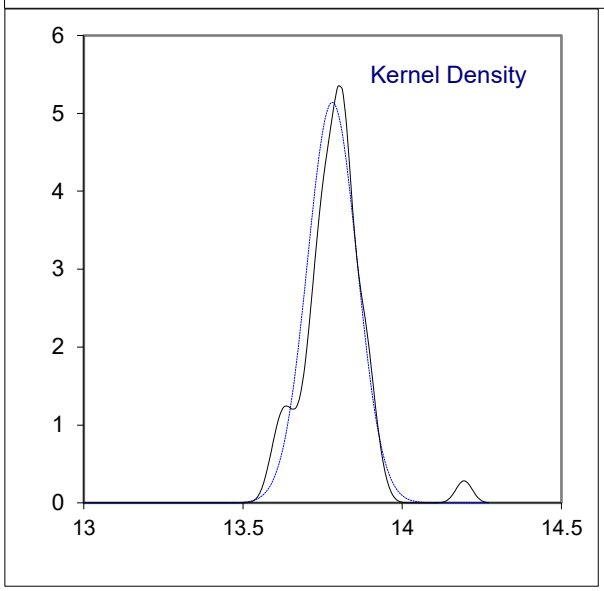


Determination of Kinematic Viscosity at 100 °C on sample #22086; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211	D445	13.75		-0.54	
214	D7042	14.194	R(0.01)	7.42	
225	D445	13.76		-0.36	
235		-----		-----	
237	D445	13.74		-0.72	
254	D445	13.89		1.97	
256	D445	13.68		-1.80	
257	D7279 corr. to D445	13.59		-3.41	
309	D445	13.77		-0.18	
311	D445	13.72		-1.08	
325	D445	13.75		-0.54	
331		-----		-----	
333	D445	13.76		-0.36	
349	D445	13.79		0.18	
381	D445	13.63	C	-2.69	first reported 117.1
392		-----		-----	
421	ISO3104	13.84		1.07	
451		-----		-----	
496	D7042	13.880		1.79	
512		-----		-----	
542	D7042	13.8165		0.65	
562		-----		-----	
603	D7042	13.851		1.27	
614	D7042	13.82		0.71	
633	D445	13.851		1.27	
634	D445	13.75		-0.54	
657		-----		-----	
663	D445	13.793		0.23	
780	D445	13.71		-1.26	
823	ISO3104	13.76		-0.36	
840	D445	13.800		0.35	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D445	13.80		0.35	
901		-----		-----	
912	D445	13.93		2.69	
922	D445	13.86		1.43	
962	D445	13.90		2.15	
963	D445	13.78		0.00	
974	D445	13.88		1.79	
994	D7042	13.82		0.71	
1023	D445	13.723		-1.03	
1059	ISO3104	13.82		0.71	
1146	D445	13.74		-0.72	
1173		-----		-----	
1316	ISO3104	13.75		-0.54	
1318	D7042	13.845		1.16	
1435	D7042	13.6435		-2.45	
1495	ISO3104	11	R(0.01)	-49.85	
1648	D445	13.825		0.80	
1720	D7042	13.81		0.53	
1740	D445	13.79		0.18	
1743		-----	W	-----	test result withdrawn, reported 13.59
1761		-----		-----	
1807	D445	13.67		-1.98	
1850	ISO3104	13.88		1.79	
1854	D445	13.61		-3.05	
1900		-----		-----	
2133	D445	13.63		-2.69	
6002	ISO3104	13.774		-0.11	
6016	D7042	13.819		0.70	
6043	D7042	13.8		0.35	
6044	D7042	13.71		-1.26	
6059	D445	13.71		-1.26	
6257	ISO3104	13.81		0.53	
6307	IP71	13.822		0.75	
6380	D445	13.897		2.09	
6402	D445	13.79		0.18	
6414		-----		-----	
6441	D7042	13.811		0.55	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	53
outliers	2
mean (n)	13.780
st.dev. (n)	0.0776
R(calc.)	0.217
st.dev.(D445:21e1)	0.0558
R(D445:21e1)	0.156

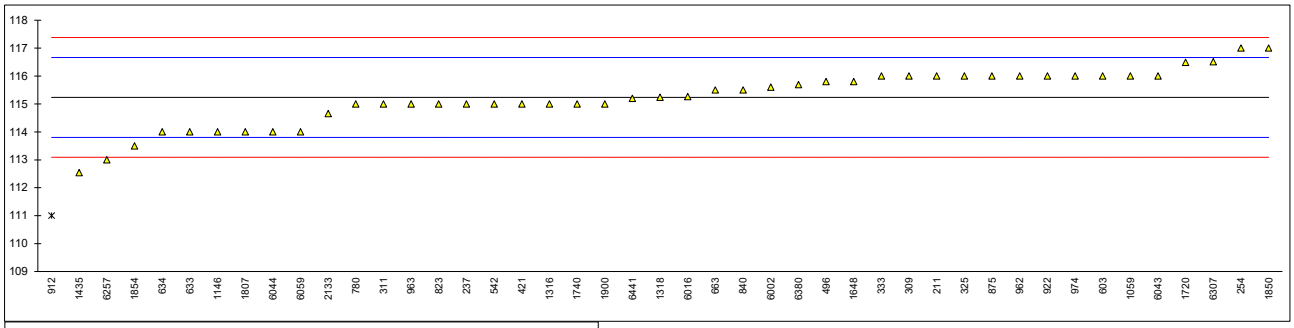


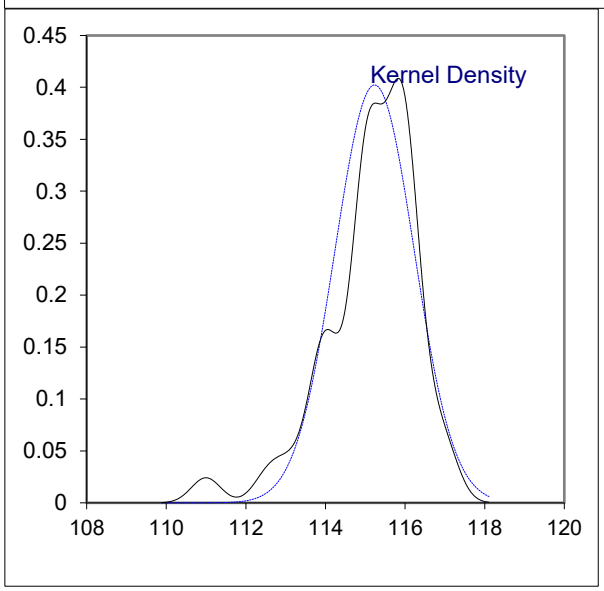


Determination of Viscosity Index on sample #22086

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211	D2270	116		1.07	
214		-----		-----	
225		-----		-----	
235		-----		-----	
237	D2270	115		-0.33	
254	D2270	117		2.47	
256		-----		-----	
257		-----		-----	
309	D2270	116		1.07	
311	D2270	115		-0.33	
325	D2270	116		1.07	
331		-----		-----	
333	D2270	116		1.07	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421	ISO2909	115		-0.33	
451		-----		-----	
496	D2270	115.8		0.79	
512		-----		-----	
542	D2270	115		-0.33	
562		-----		-----	
603	D2270	116		1.07	
614		-----		-----	
633	D2270	114		-1.73	
634	D2270	114		-1.73	
657		-----		-----	
663	D2270	115.5		0.37	
780	D2270	115		-0.33	
823	D2270	115		-0.33	
840	D2270	115.5		0.37	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D2270	116		1.07	
901		-----		-----	
912	D2270	111	ex	-5.93	test result excluded as statistical outlier in KV40 °C
922	D2270	116		1.07	
962	D2270	116.0	E	1.07	calculated difference, iis calculated 115.2
963	D2270	115		-0.33	
974	D2270	116		1.07	
994		-----		-----	
1023		-----		-----	
1059	ISO2909	116		1.07	
1146	D2270	114		-1.73	
1173		-----		-----	
1316	D2270	115		-0.33	
1318	D2270	115.24		0.01	
1435	D2270	112.54		-3.77	
1495		-----		-----	
1648	D2270	115.80		0.79	
1720	D2270	116.489		1.76	
1740	D2270	115		-0.33	
1743		-----	W	-----	test result with drawn, reported 112
1761		-----		-----	
1807	D2270	114		-1.73	
1850		117		2.47	
1854	D2270	113.5		-2.43	
1900	D7279	115.00		-0.33	
2133	D2270	114.655		-0.81	
6002	ISO2909	115.6		0.51	
6016	D2270	115.26		0.04	
6043	D2270	116		1.07	
6044	D2270	114		-1.73	
6059	D2270	114		-1.73	
6257	ISO2909	113	E	-3.13	calculated difference, iis calculated 117
6307	D2270	116.512		1.79	
6380	D2270	115.688		0.64	
6402		-----		-----	
6414		-----		-----	
6441	D2270	115.2		-0.05	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	44
outliers	0 + 1ex
mean (n)	115.23
st.dev. (n)	0.992
R(calc.)	2.78
st.dev.(D2270:10R16)	0.714
R(D2270:10R16)	2

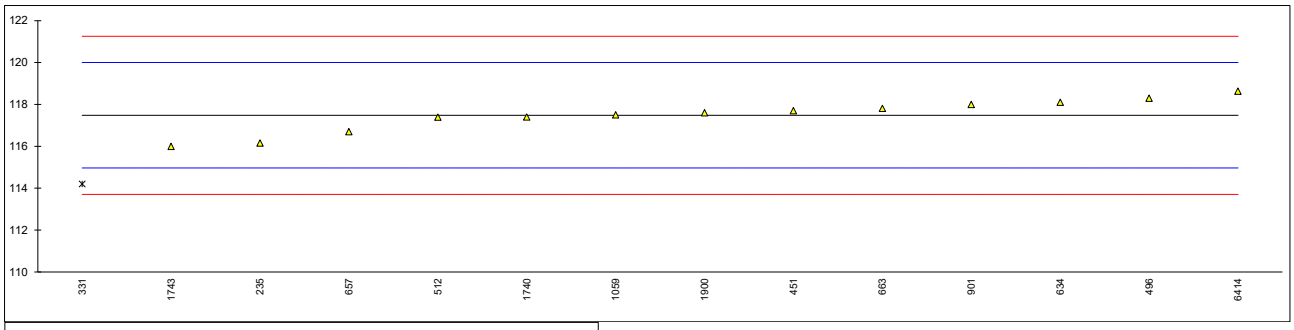


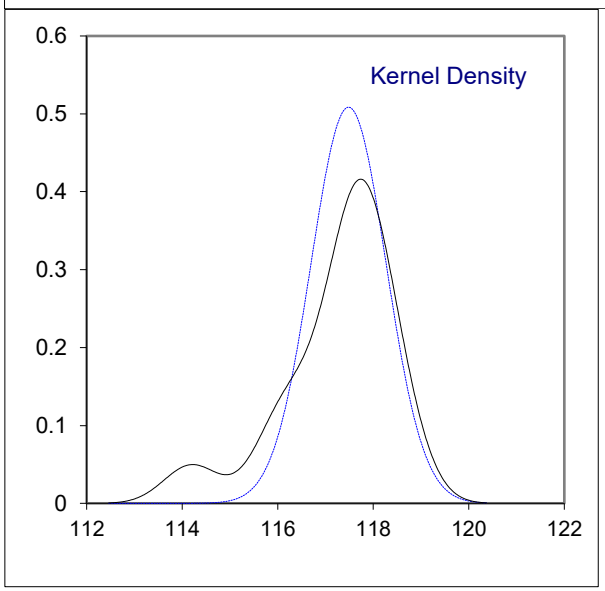


Determination of Kinematic Viscosity Houillon at 40 °C on sample #22086; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D7279	116.157		-1.05	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311		-----		-----	
325		-----		-----	
331	D7279Mod.	114.2	G(0.05)	-2.61	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451	D7279	117.7		0.17	
496	D7279	118.3		0.65	
512	D7279	117.39		-0.07	
542		-----		-----	
562		-----		-----	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634	D7279	118.1		0.49	
657	D7279	116.70		-0.62	
663	D7279	117.81		0.26	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D7279	118.0		0.41	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1059	D7279	117.5		0.01	
1146		-----		-----	
1173		-----		-----	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740	D7279	117.4		-0.07	
1743	D7279	116.0		-1.18	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D7279	117.60		0.09	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6257		-----		-----	
6307		-----		-----	
6380		-----		-----	
6402		-----		-----	
6414	D7279	118.63		0.91	
6441		-----		-----	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	13
outliers	1
mean (n)	117.484
st.dev. (n)	0.7845
R(calc.)	2.197
st.dev.(D7279:20)	1.2588
R(D7279:20)	3.525

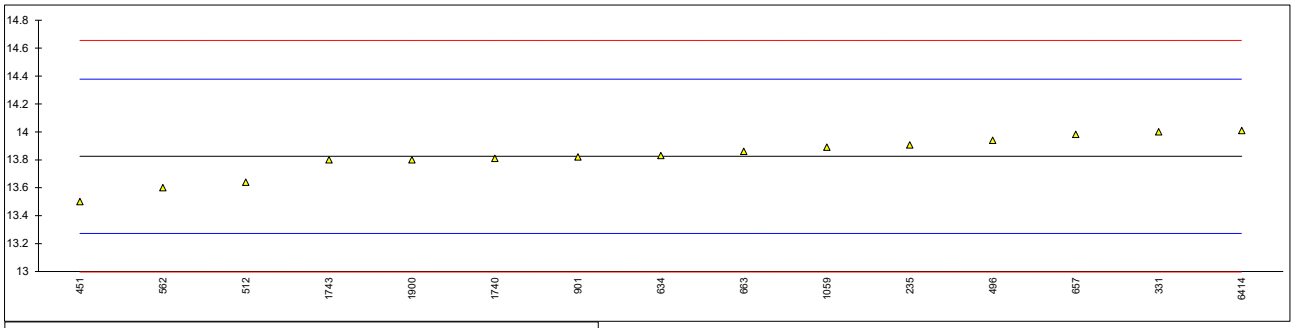


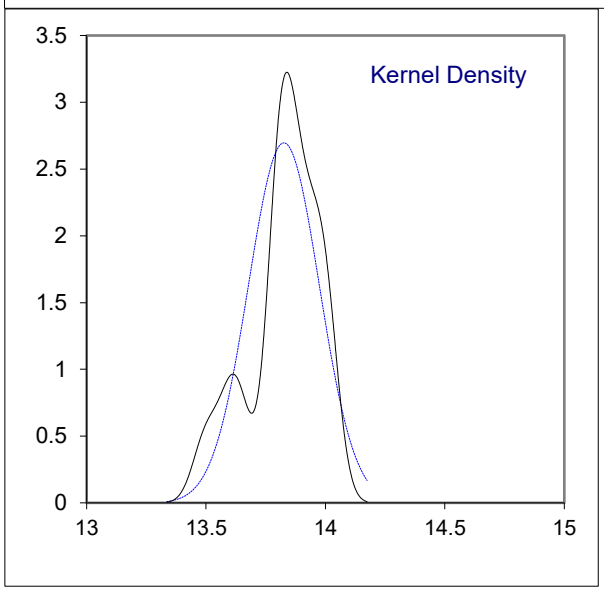


Determination of Kinematic Viscosity Houillon at 100 °C on sample #22086; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225		-----		-----	
235	D7279	13.906		0.29	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309		-----		-----	
311		-----		-----	
325		-----		-----	
331	D7279Mod.	14.0		0.63	
333		-----		-----	
349		-----		-----	
381		-----		-----	
392		-----		-----	
421		-----		-----	
451	D7279	13.50		-1.18	
496	D7279	13.94		0.41	
512	D7279	13.64		-0.67	
542		-----		-----	
562	D7279	13.60		-0.82	
603		-----		-----	
614		-----		-----	
633		-----		-----	
634	D7279	13.83		0.01	
657	D7279	13.982		0.56	
663	D7279	13.860		0.12	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D7279	13.82		-0.02	
912		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1059	D7279	13.89		0.23	
1146		-----		-----	
1173		-----		-----	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740	D7279	13.81		-0.06	
1743	D7279	13.80		-0.09	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D7279	13.80		-0.09	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6257		-----		-----	
6307		-----		-----	
6380		-----		-----	
6402		-----		-----	
6414	D7279	14.01		0.67	
6441		-----		-----	
6462		-----		-----	
6464		-----		-----	

normality	OK
n	15
outliers	0
mean (n)	13.8259
st.dev. (n)	0.14802
R(calc.)	0.4144
st.dev.(D7279:20)	0.27652
R(D7279:20)	0.7742

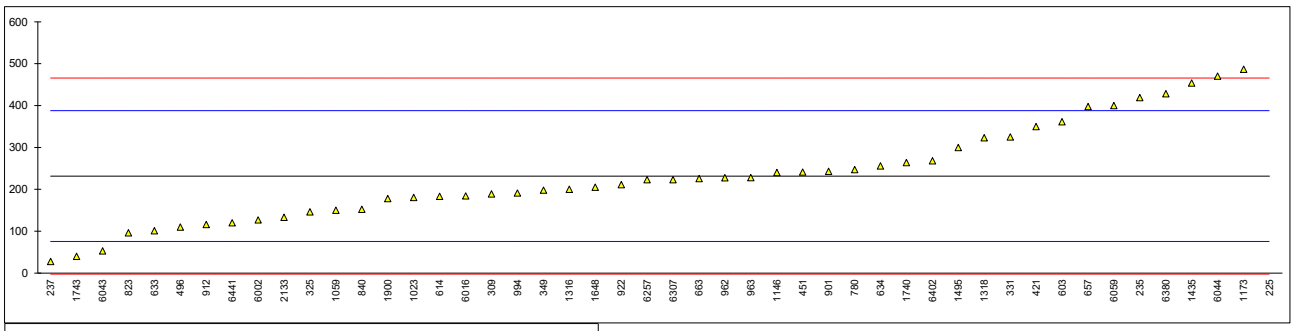


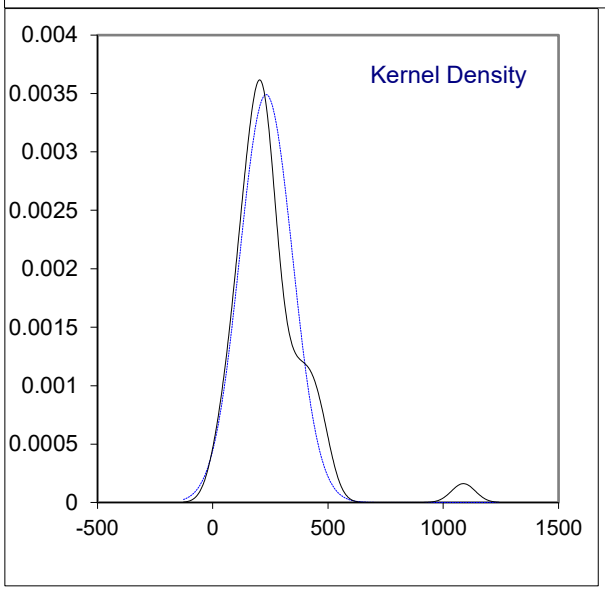


Determination of Water on sample #22086; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
214		-----		-----	
225	D6304-A	1088	R(0.01)	10.98	
235	D6304-C:16e1	419		2.40	
237	D6304-C:16e1	28		-2.61	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D6304-C:20	189		-0.55	
311		-----		-----	
325	D6304-C:20	146		-1.10	
331	D6304-C	325		1.20	
333		-----		-----	
349	D6304-C:20	198		-0.43	
381		-----		-----	
392		-----		-----	
421	D6304-B:20	349.8		1.51	
451	D6304-B	241		0.12	
496	D6304-B:20	110		-1.56	
512		-----		-----	
542		-----		-----	
562		-----		-----	
603	D6304-C	361.3		1.66	
614	D6304-B:20	183		-0.63	
633	D6304-B:20	101.16		-1.67	
634	D6304-B:20	256		0.31	
657	D6304-C:20	397.3		2.12	
663	D6304-B	225.4		-0.08	
780	D6304-B:20	247		0.20	
823	D6304-C:20	96		-1.74	
840	D6304-B:20	152.4		-1.02	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D6304-C:20	242.8		0.14	
912	D6304	116		-1.48	
922	D6304-A:16e1	211		-0.27	
962	D6304-C:16e1	227.8		-0.05	
963	D6304-C:16e1	228.1		-0.05	
974		-----		-----	
994	D6304-C:20	191		-0.52	
1023	D6304-C:20	180.6		-0.66	
1059	D6304-B:20	150		-1.05	
1146	D6304-B:20	240		0.11	
1173	In house	486.8		3.27	
1316	D6304-B:20	200		-0.41	
1318	D6304-B:20	323.2		1.17	
1435	D6304-A	453.78		2.85	
1495	E203	300		0.88	
1648	D6304-C:20	204.8		-0.35	
1720		-----		-----	
1740	D6304-A:16e1	264		0.41	
1743	D6304-B:16e1	40		-2.46	
1761		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D6304-C:16e1	178.00		-0.69	
2133	D6304-B:20	133		-1.27	
6002	In house	126.94		-1.34	
6016	D6304-A:20	184.3		-0.61	
6043	D6304-A:16e1	53		-2.29	
6044	D6304-C:16e1	470.2		3.06	
6059	D6304-A:20	400		2.16	
6257	ISO12937	223		-0.11	
6307	IP74	223		-0.11	
6380	D6304-A:16e1	428.1		2.52	
6402	D7889	268		0.46	
6414		-----		-----	
6441	D6304-A:20	120		-1.43	
6462		-----		-----	
6464		-----		-----	

	normality	OK
	n	47
	outliers	1
	mean (n)	231.76
	st.dev. (n)	114.309
	R(calc.)	320.07
	st.dev.(D6304-B:20)	77.981
	R(D6304-B:20)	218.35
compare		
	R(D6304-A:20)	108.90
	R(D6304-C:20)	87.90

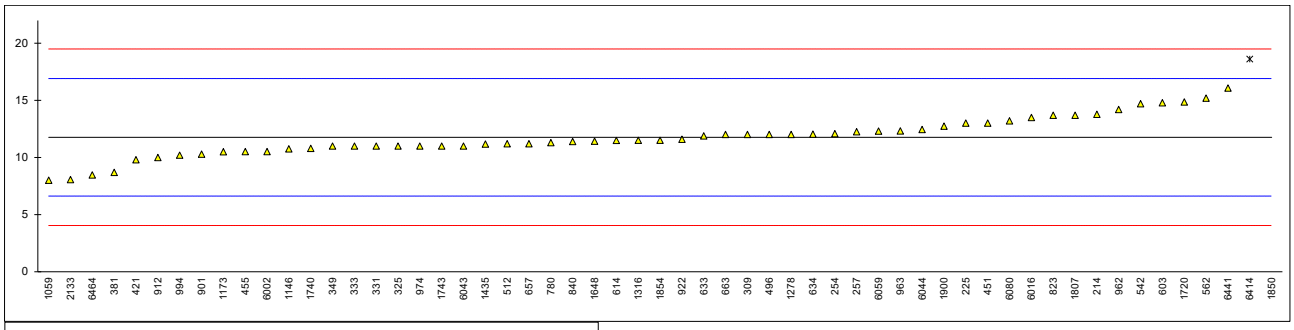


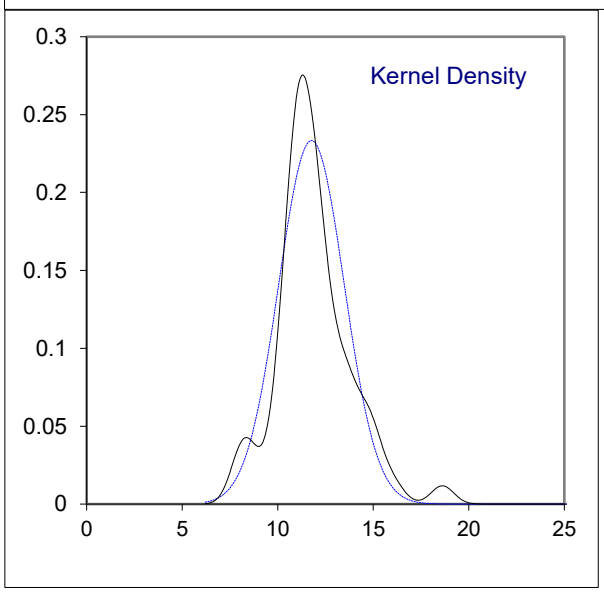


Determination of Aluminum as Al on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	13.77		0.78	
225	D6595	13		0.48	
235		-----		-----	
237		-----		-----	
254		12.080		0.12	
256		-----		-----	
257	D6595	12.25		0.19	
309	D5185	12		0.09	
325	D5185	11		-0.30	
331	D5185Mod.	11		-0.30	
333	D5185	11		-0.30	
349	D5185	11		-0.30	
381	D5185	8.7	C	-1.19	first reported 10.1
392		-----		-----	
421	D5185	9.8		-0.76	
451	D5185	13		0.48	
455	D5185	10.514		-0.49	
496	D5185	12.0		0.09	
512	D5185	11.20		-0.22	
542	D6595	14.7		1.14	
562	D6595	15.2		1.33	
603	D5185	14.78		1.17	
614	D5185	11.49		-0.11	
633	D6595	11.889		0.05	
634	D6595	12.05		0.11	
657	D5185	11.20		-0.22	
663	D5185	12.0		0.09	
780	D5185	11.3		-0.18	
823	D5185	13.7		0.75	
840	D5185	11.4		-0.14	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D5185	10.29		-0.57	
912	D5185	10		-0.69	
922	D5185	11.6		-0.06	
962	D5185	14.2		0.94	
963	D5185	12.33		0.22	
974	D5185	11		-0.30	
994	D5185	10.2		-0.61	
1059	In house	8		-1.46	
1146	In house	10.76		-0.39	
1173	In house	10.51		-0.49	
1278	D5185	12		0.09	
1316	D5185	11.5		-0.10	
1435	D5185	11.164		-0.23	
1495		-----		-----	
1648	D5185	11.42		-0.13	
1720	D5708	14.856		1.20	
1740	D5185	10.8		-0.38	
1743	NF T60-106	11		-0.30	
1807	D5185	13.7		0.75	
1850	In house	36	R(0.01)	9.41	
1854	D5185	11.5		-0.10	
1900	D5185	12.74		0.38	
2133		8.059		-1.44	
6002	D5185	10.52		-0.48	
6016	D6595	13.5		0.67	
6043	D5185	11		-0.30	
6044	D5185	12.44		0.26	
6059	D5185	12.31		0.21	
6080	D5185	13.2		0.56	
6322	DIN51418	<3	C	<-3.40	first reported 5, possibly a false negative test result?
6414	D5185	18.62	R(0.05)	2.66	
6441	D5185	16.07		1.67	
6464	D5185	8.471		-1.28	

normality	OK
n	55
outliers	2
mean (n)	11.767
st.dev. (n)	1.7106
R(calc.)	4.790
st.dev.(D5185:18)	2.5763
R(D5185:18)	7.214



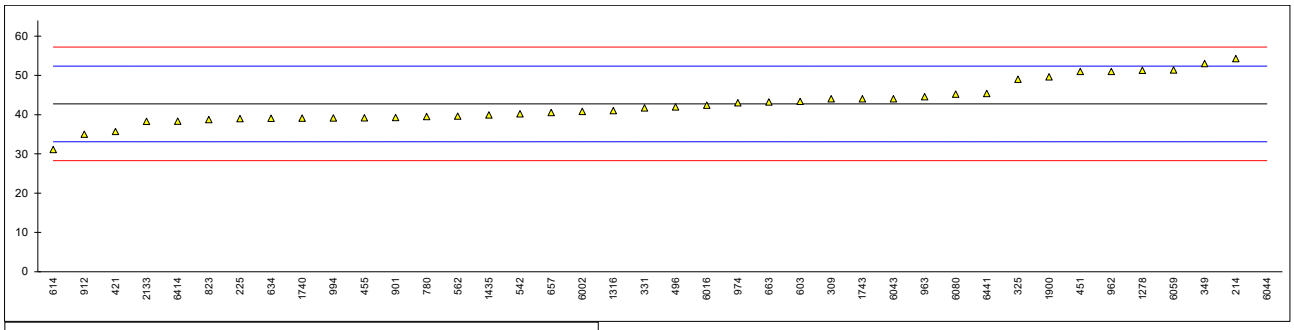


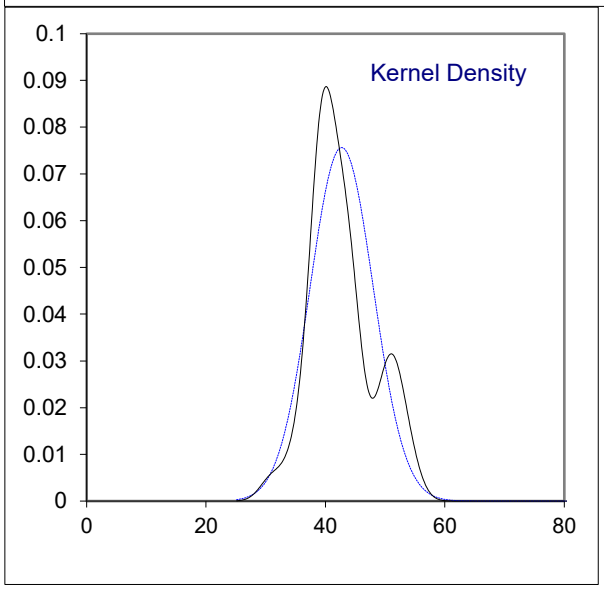
Determination of Boron as B on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	54.26		2.39	
225	D6595	39		-0.78	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D5185	44		0.26	
325	D5185	49		1.30	
331	D5185Mod.	41.7		-0.21	
333	D5185	>30		-----	
349	D5185	53		2.13	
381		-----		-----	
392		-----		-----	
421	D5185	35.7		-1.46	
451	D5185	51		1.71	
455	D5185	39.16933	C	-0.74	first reported 0
496	D5185	41.95		-0.16	
512		-----		-----	
542	D6595	40.2		-0.53	
562	D6595	39.6		-0.65	
603	D5185	43.36		0.13	
614	D5185	31.09		-2.42	
633		-----		-----	
634	D6595	39.07		-0.76	
657	D5185	40.53		-0.46	
663	D5185	43.2		0.10	
780	D5185	39.5		-0.67	
823	D5185	38.7		-0.84	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D5185	39.25		-0.72	
912	D5185	35		-1.60	
922		-----		-----	
962	D5185	51		1.71	
963	D5185	44.56		0.38	
974	D5185	43		0.05	
994	D5185	39.15		-0.74	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1278	D5185	51.3		1.78	
1316	D5185	41.0		-0.36	
1435	D5185	39.934		-0.58	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740	D5185	39.1		-0.75	
1743	NF T60-106	44		0.26	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D5185	49.62		1.43	
2133		38.305		-0.92	
6002	D5185	40.8		-0.40	
6016	D6595	42.4		-0.07	
6043	D5185	44		0.26	
6044	D5185	97.1	R(0.01)	11.28	
6059	D5185	51.36		1.79	
6080	D5185	45.2		0.51	
6322		-----		-----	
6414	D5185	38.313		-0.92	
6441	D5185	45.38		0.55	
6464		-----		-----	

normality	OK
n	39
outliers	1
mean (n)	42.736
st.dev. (n)	5.2760
R(calc.)	14.773
st.dev.(D5185:18)	4.8205
R(D5185:18)	13.497

application range: 4 – 30 mg/kg

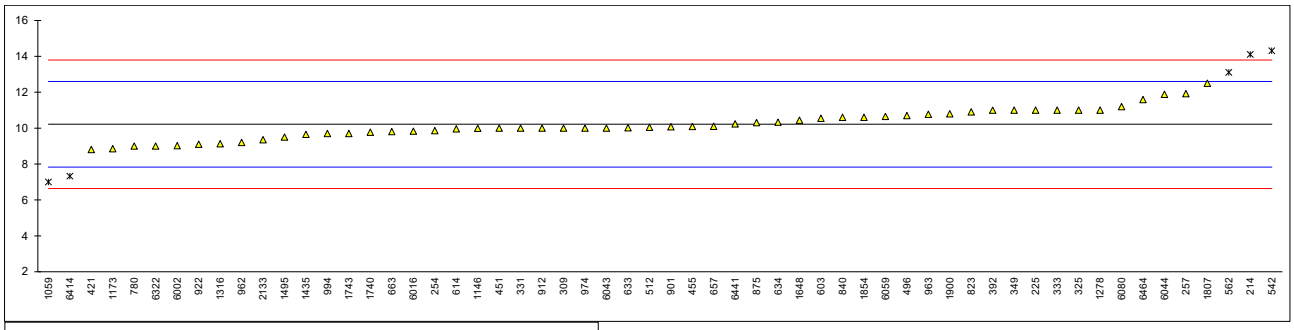


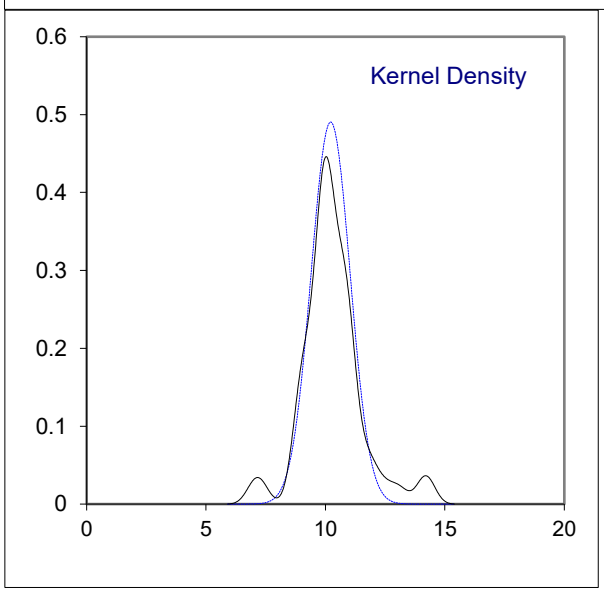


Determination of Chromium as Cr on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	14.10	R(0.05)	3.25	
225	D6595	11		0.66	
235		-----		-----	
237		-----		-----	
254		9.86		-0.30	
256		-----		-----	
257	D6595	11.92		1.43	
309	D5185	10		-0.18	
325	D5185	11		0.66	
331	D5185Mod.	10		-0.18	
333	D5185	11		0.66	
349	D5185	11		0.66	
381		-----		-----	
392		10.9943		0.65	
421	D5185	8.8		-1.19	
451	D5185	10		-0.18	
455	D5185	10.09067	C	-0.11	first reported 0
496	D5185	10.7		0.40	
512	D5185	10.05		-0.14	
542	D6595	14.3	R(0.05)	3.42	
562	D6595	13.1	R(0.05)	2.42	
603	D5185	10.55		0.28	
614	D5185	9.95		-0.22	
633	D6595	10.024		-0.16	
634	D6595	10.33	C	0.10	first reported 14.33
657	D5185	10.10		-0.10	
663	D5185	9.8		-0.35	
780	D5185	9.0		-1.02	
823	D5185	10.9		0.57	
840	D5185	10.6		0.32	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	10.3		0.07	
901	D5185	10.07		-0.12	
912	D5185	10		-0.18	
922	D5185	9.1		-0.94	
962	D5185	9.2		-0.85	
963	D5185	10.77		0.46	
974	D5185	10		-0.18	
994	D5185	9.7		-0.43	
1059	In house	7	R(0.05)	-2.69	
1146	In house	9.989		-0.19	
1173	In house	8.85		-1.14	
1278	D5185	11		0.66	
1316	D5185	9.12		-0.92	
1435	D5185	9.653		-0.47	
1495		9.5		-0.60	
1648	D5185	10.44		0.19	
1720		-----		-----	
1740	D5185	9.77		-0.37	
1743	NF T60-106	9.7		-0.43	
1807	D5185	12.5		1.91	
1850	In house	<5		<-4.37	possibly a false negative test result?
1854	D5185	10.6		0.32	
1900	D5185	10.79		0.48	
2133		9.352		-0.72	
6002	D5185	9.02		-1.00	
6016	D6595	9.83	C	-0.32	first reported 13.5
6043	D5185	10		-0.18	
6044	D5185	11.88		1.39	
6059	D5185	10.65		0.36	
6080	D5185	11.2		0.82	
6322	DIN51418	9		-1.02	
6414	D5185	7.320	R(0.05)	-2.43	
6441	D5185	10.23		0.01	
6464	D5185	11.59		1.15	

normality	OK
n	53
outliers	5
mean (n)	10.216
st.dev. (n)	0.8138
R(calc.)	2.279
st.dev.(D5185:18)	1.1940
R(D5185:18)	3.343

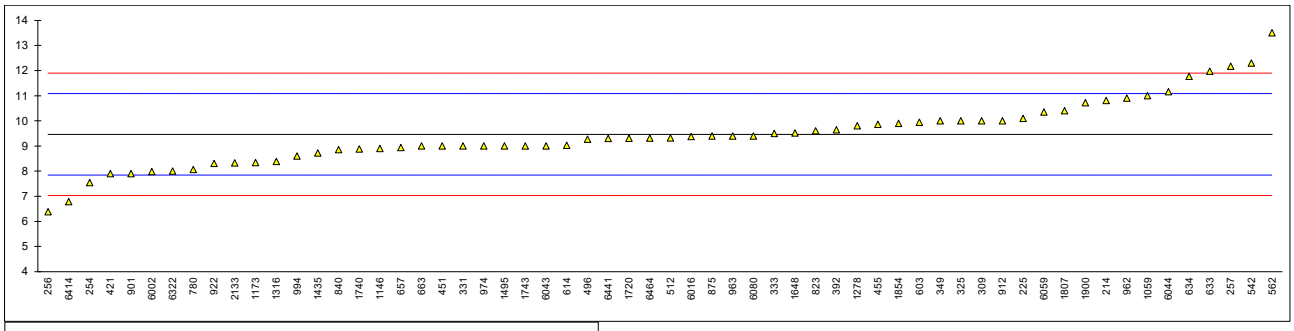


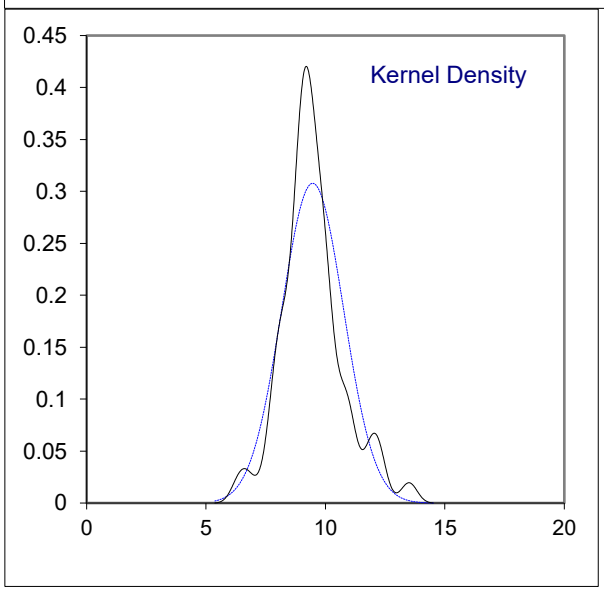


Determination of Copper as Cu on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	10.81		1.66	
225	D6595	10.1		0.78	
235		-----		-----	
237		-----		-----	
254		7.54		-2.37	
256	In house	6.38		-3.80	
257	D6595	12.17		3.34	
309	D5185	10		0.66	
325	D5185	10		0.66	
331	D5185Mod.	9		-0.57	
333	D5185	9.5		0.05	
349	D5185	10		0.66	
381		-----		-----	
392		9.6453		0.22	
421	D5185	7.9		-1.93	
451	D5185	9		-0.57	
455	D5185	9.86		0.49	
496	D5185	9.27		-0.24	
512	D5185	9.32		-0.18	
542	D6595	12.3		3.50	
562	D6595	13.5		4.98	
603	D5185	9.939		0.59	
614	D5185	9.03		-0.53	
633	D6595	11.972		3.09	
634	D6595	11.77	C	2.84	first reported 13.77
657	D5185	8.94		-0.65	
663	D5185	9.00		-0.57	
780	D5185	8.06		-1.73	
823	D5185	9.6		0.17	
840	D5185	8.85		-0.76	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	9.4		-0.08	
901	D5185	7.90		-1.93	
912	D5185	10		0.66	
922	D5185	8.3		-1.43	
962	D5185	10.9		1.77	
963	D5185	9.40		-0.08	
974	D5185	9		-0.57	
994	D5185	8.6		-1.06	
1059	In house	11		1.89	
1146	In house	8.903		-0.69	
1173	In house	8.34		-1.39	
1278	D5185	9.8		0.41	
1316	D5185	8.38		-1.34	
1435	D5185	8.717		-0.92	
1495		9		-0.57	
1648	D5185	9.52		0.07	
1720	D5708	9.307		-0.19	
1740	D5185	8.88		-0.72	
1743	NF T60-106	9.0		-0.57	
1807	D5185	10.4	C	1.15	first reported 14.2
1850	In house	<10		-----	
1854	D5185	9.9		0.54	
1900	D5185	10.72		1.55	
2133		8.325		-1.40	
6002	D5185	7.98		-1.83	
6016	D6595	9.37	C	-0.12	first reported 12.8
6043	D5185	9		-0.57	
6044	D5185	11.16		2.09	
6059	D5185	10.35		1.09	
6080	D5185	9.4		-0.08	
6322	DIN51418	8		-1.80	
6414	D5185	6.785		-3.30	
6441	D5185	9.301		-0.20	
6464	D5185	9.315		-0.18	

normality	suspect
n	60
outliers	0
mean (n)	9.463
st.dev. (n)	1.2957
R(calc.)	3.628
st.dev.(D5185:18)	0.8112
R(D5185:18)	2.271

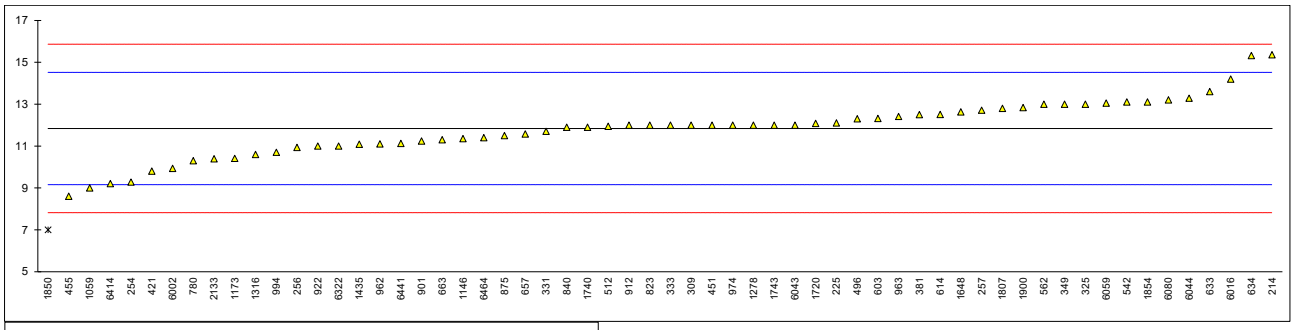


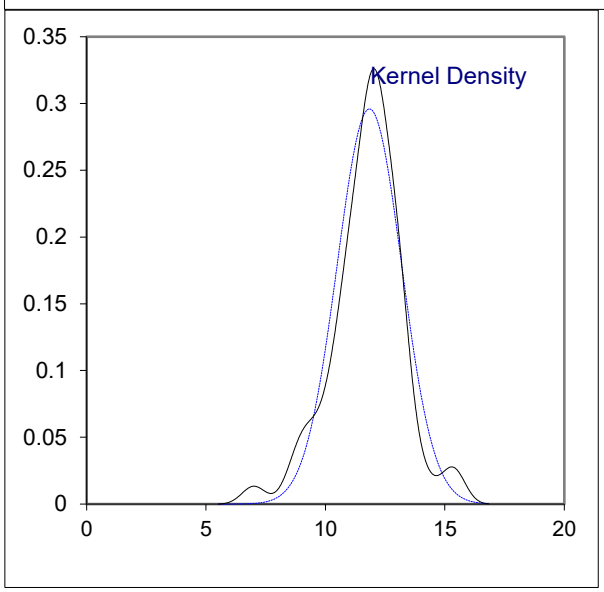


Determination of Iron as Fe on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	15.36		2.62	
225	D6595	12.1		0.19	
235		-----		-----	
237		-----		-----	
254		9.28		-1.91	
256	In house	10.93		-0.68	
257	D6595	12.71		0.65	
309	D5185	12		0.12	
325	D5185	13		0.86	
331	D5185Mod.	11.7		-0.11	
333	D5185	12		0.12	
349	D5185	13		0.86	
381	D5185	12.5		0.49	
392		-----		-----	
421	D5185	9.8		-1.52	
451	D5185	12		0.12	
455	D5185	8.606		-2.41	
496	D5185	12.3		0.34	
512	D5185	11.94		0.07	
542	D6595	13.1		0.94	
562	D6595	13.0		0.86	
603	D5185	12.32		0.36	
614	D5185	12.51		0.50	
633	D6595	13.603		1.31	
634	D6595	15.32		2.59	
657	D5185	11.58		-0.20	
663	D5185	11.3		-0.40	
780	D5185	10.3		-1.15	
823	D5185	12.0		0.12	
840	D5185	11.9		0.04	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	11.5		-0.25	
901	D5185	11.24		-0.45	
912	D5185	12		0.12	
922	D5185	11.0		-0.63	
962	D5185	11.1		-0.55	
963	D5185	12.41		0.42	
974	D5185	12		0.12	
994	D5185	10.7		-0.85	
1059	In house	9		-2.12	
1146	In house	11.35		-0.37	
1173	In house	10.41		-1.07	
1278	D5185	12		0.12	
1316	D5185	10.6		-0.93	
1435	D5185	11.083		-0.57	
1495		-----		-----	
1648	D5185	12.63		0.59	
1720	D5708	12.076		0.17	
1740	D5185	11.9		0.04	
1743	NF T60-106	12		0.12	
1807	D5185	12.8	C	0.71	first reported 17.9
1850	In house	7	R(0.05)	-3.61	
1854	D5185	13.1		0.94	
1900	D5185	12.83		0.74	
2133		10.389		-1.08	
6002	D5185	9.93		-1.43	
6016	D6595	14.2		1.76	
6043	D5185	12		0.12	
6044	D5185	13.28		1.07	
6059	D5185	13.05		0.90	
6080	D5185	13.2		1.01	
6322	DIN51418	11		-0.63	
6414	D5185	9.207		-1.96	
6441	D5185	11.12		-0.54	
6464	D5185	11.40		-0.33	

normality	OK
n	59
outliers	1
mean (n)	11.842
st.dev. (n)	1.3482
R(calc.)	3.775
st.dev.(D5185:18)	1.3415
R(D5185:18)	3.756

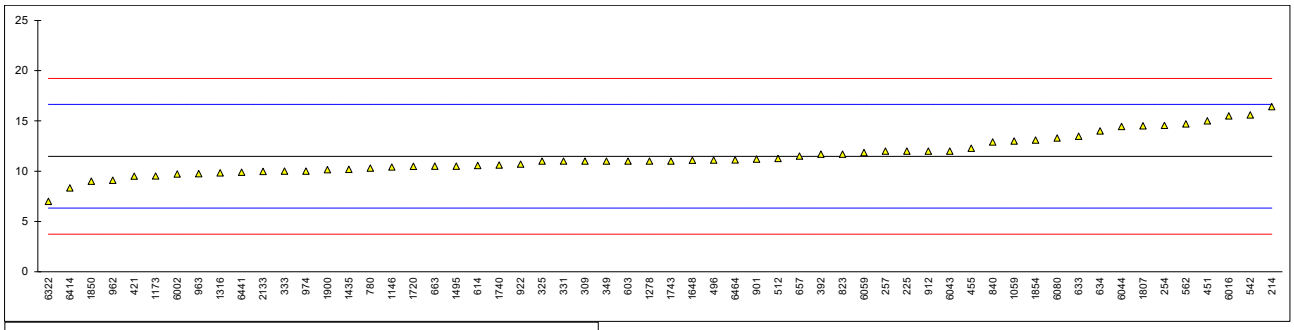


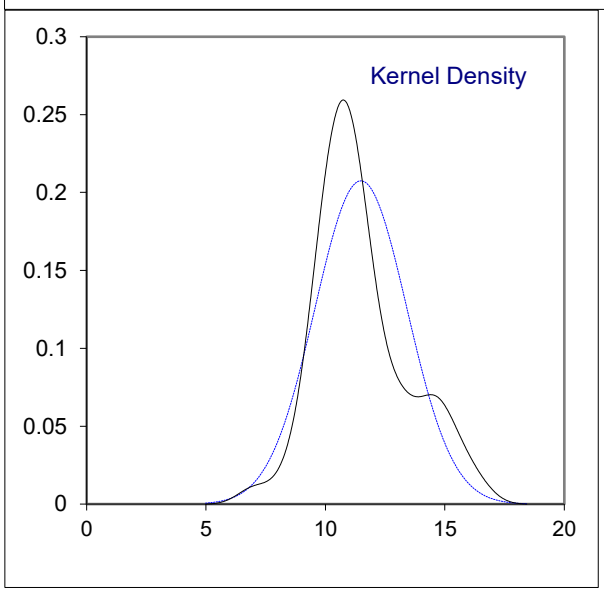


Determination of Lead as Pb on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	16.42		1.91	
225	D6595	12.0		0.20	
235		-----		-----	
237		-----		-----	
254		14.55		1.19	
256		-----		-----	
257	D6595	11.99		0.19	
309	D5185	11		-0.19	
325	D5185	11		-0.19	
331	D5185Mod.	11		-0.19	
333	D5185	10		-0.58	
349	D5185	11		-0.19	
381		-----		-----	
392		11.6943		0.08	
421	D5185	9.5		-0.77	
451	D5185	15		1.36	
455	D5185	12.277		0.31	
496	D5185	11.1		-0.15	
512	D5185	11.25		-0.09	
542	D6595	15.6		1.59	
562	D6595	14.7		1.25	
603	D5185	11.00		-0.19	
614	D5185	10.56		-0.36	
633	D6595	13.471		0.77	
634	D6595	14.0		0.97	
657	D5185	11.50		0.00	
663	D5185	10.5		-0.38	
780	D5185	10.3		-0.46	
823	D5185	11.7		0.08	
840	D5185	12.9		0.55	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D5185	11.20		-0.11	
912	D5185	12		0.20	
922	D5185	10.7		-0.31	
962	D5185	9.1		-0.93	
963	D5185	9.74		-0.68	
974	D5185	10		-0.58	
994	D5185	<10		-----	
1059	In house	13		0.59	
1146	In house	10.41		-0.42	
1173	In house	9.52		-0.76	
1278	D5185	11		-0.19	
1316	D5185	9.84		-0.64	
1435	D5185	10.186		-0.50	
1495		10.5		-0.38	
1648	D5185	11.09		-0.15	
1720	D5708	10.489		-0.39	
1740	D5185	10.6		-0.34	
1743	NF T60-106	11		-0.19	
1807	D5185	14.5		1.17	
1850	In house	9		-0.96	
1854	D5185	13.1		0.63	
1900	D5185	10.15		-0.52	
2133		9.974		-0.59	
6002	D5185	9.71		-0.69	
6016	D6595	15.5		1.56	
6043	D5185	12		0.20	
6044	D5185	14.44		1.14	
6059	D5185	11.85		0.14	
6080	D5185	13.3		0.70	
6322	DIN51418	7	C	-1.74	first reported 6
6414	D5185	8.335		-1.22	
6441	D5185	9.902		-0.61	
6464	D5185	11.12		-0.14	

normality	OK
n	58
outliers	0
mean (n)	11.487
st.dev. (n)	1.9237
R(calc.)	5.386
st.dev.(D5185:18)	2.5801
R(D5185:18)	7.224

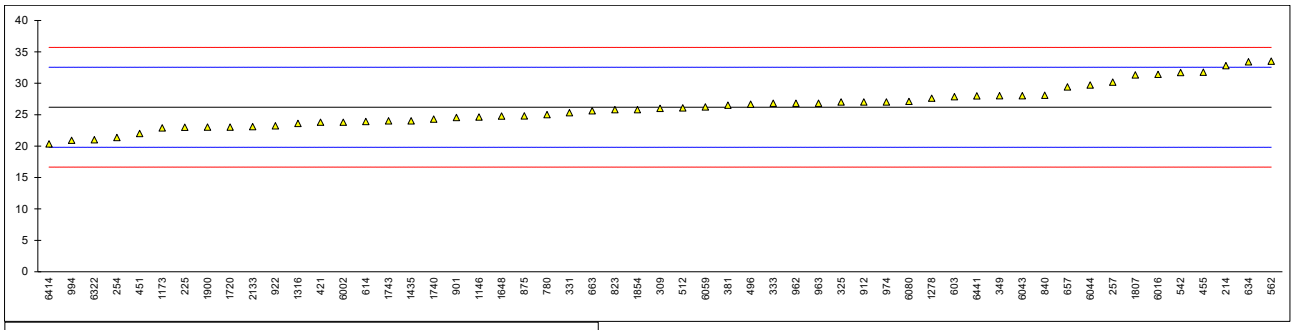


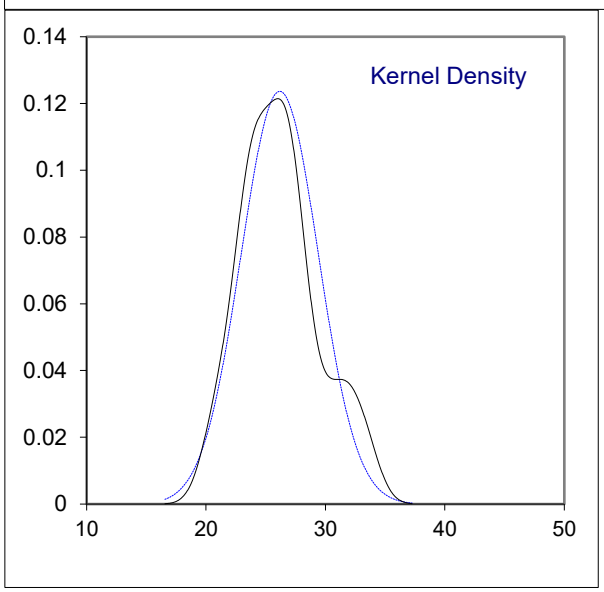


Determination of Magnesium as Mg on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	32.78		2.08	
225	D6595	23		-1.00	
235		-----		-----	
237		-----		-----	
254		21.35		-1.52	
256		-----		-----	
257	D6595	30.16		1.25	
309	D5185	26		-0.06	
325	D5185	27		0.26	
331	D5185Mod.	25.3		-0.28	
333	D5185	26.8		0.19	
349	D5185	28		0.57	
381	D5185	26.5		0.10	
392		-----		-----	
421	D5185	23.8		-0.75	
451	D5185	22		-1.32	
455	D5185	31.74433	C	1.75	first reported 1.486
496	D5185	26.67		0.15	
512	D5185	26.06		-0.04	
542	D6595	31.7		1.74	
562	D6595	33.5		2.30	
603	D5185	27.86		0.53	
614	D5185	23.9		-0.72	
633		-----		-----	
634	D6595	33.4		2.27	
657	D5185	29.39		1.01	
663	D5185	25.6		-0.18	
780	D5185	25.0		-0.37	
823	D5185	25.8		-0.12	
840	D5185	28.1		0.60	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	24.8		-0.43	
901	D5185	24.54		-0.52	
912	D5185	27		0.26	
922	D5185	23.2		-0.94	
962	D5185	26.8		0.19	
963	D5185	26.81		0.20	
974	D5185	27		0.26	
994	D5185	20.9		-1.66	
1059		-----		-----	
1146	In house	24.60		-0.50	
1173	In house	22.89		-1.04	
1278	D5185	27.6		0.45	
1316	D5185	23.6		-0.81	
1435	D5185	24.004		-0.69	
1495		-----		-----	
1648	D5185	24.78		-0.44	
1720	D5708	23.016		-1.00	
1740	D5185	24.3		-0.59	
1743	NF T60-106	24.0		-0.69	
1807	D5185	31.3		1.61	
1850		-----		-----	
1854	D5185	25.8		-0.12	
1900	D5185	23.01		-1.00	
2133		23.095		-0.97	
6002	D5185	23.8		-0.75	
6016	D6595	31.4		1.64	
6043	D5185	28		0.57	
6044	D5185	29.71		1.11	
6059	D5185	26.23		0.02	
6080	D5185	27.1		0.29	
6322	DIN51418	21		-1.63	
6414	D5185	20.334		-1.84	
6441	D5185	27.96		0.56	
6464		-----		-----	

normality	OK
n	55
outliers	0
mean (n)	26.182
st.dev. (n)	3.2279
R(calc.)	9.038
st.dev.(D5185:18)	3.1771
R(D5185:18)	8.896

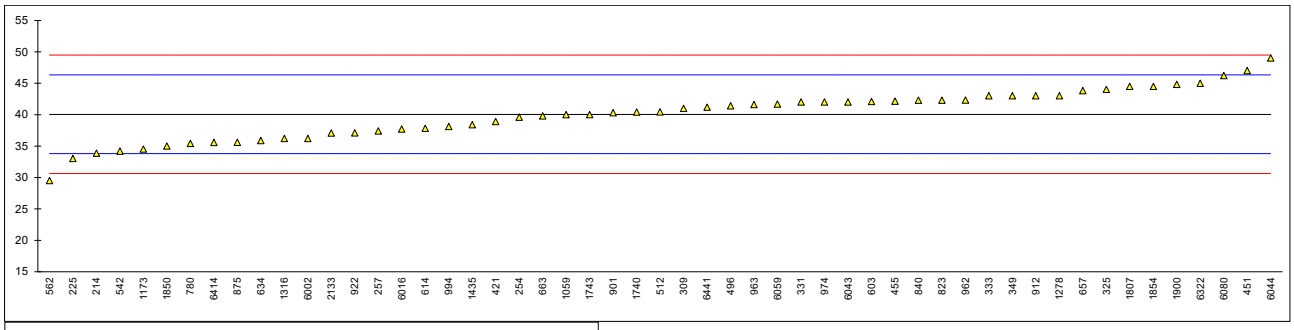


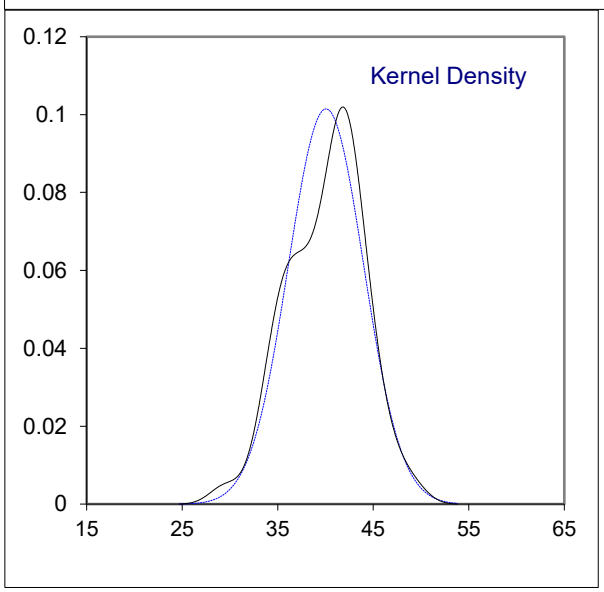


Determination of Molybdenum as Mo on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	33.86		-1.97	
225	D6595	33		-2.25	
235		-----		-----	
237		-----		-----	
254		39.575		-0.15	
256		-----		-----	
257	D6595	37.40		-0.84	
309	D5185	41		0.30	
325	D5185	44		1.26	
331	D5185Mod.	42		0.62	
333	D5185	43		0.94	
349	D5185	43		0.94	
381		-----		-----	
392		-----		-----	
421	D5185	38.9		-0.37	
451	D5185	47		2.21	
455	D5185	42.15767	C	0.67	first reported 0.342877
496	D5185	41.4		0.43	
512	D5185	40.43		0.12	
542	D6595	34.2		-1.86	
562	D6595	29.5		-3.36	
603	D5185	42.07		0.64	
614	D5185	37.83		-0.71	
633		-----		-----	
634	D6595	35.86		-1.34	
657	D5185	43.81		1.20	
663	D5185	39.8		-0.08	
780	D5185	35.4		-1.48	
823	D5185	42.3		0.72	
840	D5185	42.3		0.72	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	35.6		-1.42	
901	D5185	40.32		0.09	
912	D5185	43		0.94	
922	D5185	37.1		-0.94	
962	D5185	42.33		0.73	
963	D5185	41.59		0.49	
974	D5185	42		0.62	
994	D5185	38.1		-0.62	
1059	In house	40		-0.02	
1146		-----		-----	
1173	In house	34.51		-1.77	
1278	D5185	43		0.94	
1316	D5185	36.2		-1.23	
1435	D5185	38.410		-0.52	
1495		-----		-----	
1648		-----		-----	
1720		-----		-----	
1740	D5185	40.4		0.11	
1743	NF T60-106	40		-0.02	
1807	D5185	44.5	C	1.42	first reported 50.1
1850	In house	35	C	-1.61	first reported <21
1854	D5185	44.5		1.42	
1900	D5185	44.82		1.52	
2133		37.069		-0.95	
6002	D5185	36.2		-1.23	
6016	D6595	37.7		-0.75	
6043	D5185	42		0.62	
6044	D5185	49.02		2.86	
6059	D5185	41.7		0.52	
6080	D5185	46.2		1.96	
6322	DIN51418	45		1.58	
6414	D5185	35.569		-1.43	
6441	D5185	41.17		0.36	
6464		-----		-----	

normality	OK
n	53
outliers	0
mean (n)	40.053
st.dev. (n)	3.9328
R(calc.)	11.012
st.dev.(D5185:18)	3.1397
R(D5185:18)	8.791

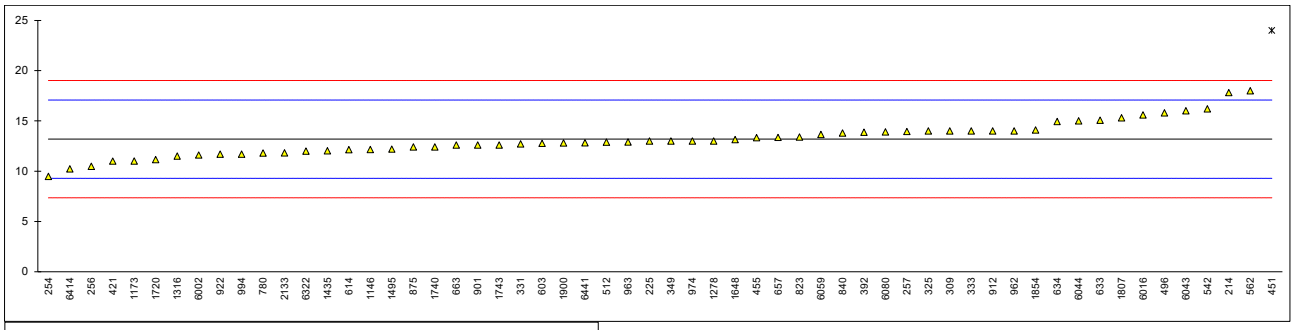


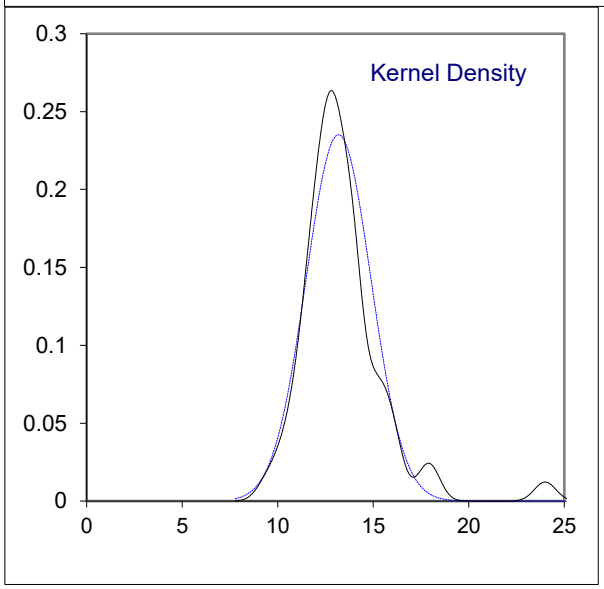


Determination of Nickel as Ni on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	17.82		2.38	
225	D6595	13.0		-0.10	
235		-----		-----	
237		-----		-----	
254		9.475		-1.91	
256	In house	10.49		-1.39	
257	D6595	13.94		0.39	
309	D5185	14		0.42	
325	D5185	14		0.42	
331	D5185Mod.	12.7		-0.25	
333	D5185	14		0.42	
349	D5185	13		-0.10	
381		-----		-----	
392		13.8729		0.35	
421	D5185	11.0		-1.12	
451	D5185	24	R(0.01)	5.56	
455	D5185	13.32033	C	0.07	first reported 41.389
496	D5185	15.8		1.34	
512	D5185	12.89		-0.15	
542	D6595	16.2		1.55	
562	D6595	18.0		2.47	
603	D5185	12.77		-0.21	
614	D5185	12.14		-0.54	
633	D6595	15.066		0.97	
634	D6595	14.95	C	0.91	first reported 17.95
657	D5185	13.35		0.08	
663	D5185	12.6		-0.30	
780	D5185	11.8		-0.71	
823	D5185	13.4		0.11	
840	D5185	13.8		0.31	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	12.4		-0.41	
901	D5185	12.60		-0.30	
912	D5185	14		0.42	
922	D5185	11.7		-0.76	
962	D5185	14.0		0.42	
963	D5185	12.91		-0.14	
974	D5185	13		-0.10	
994	D5185	11.7		-0.76	
1059		-----		-----	
1146	In house	12.15		-0.53	
1173	In house	11.01		-1.12	
1278	D5185	13		-0.10	
1316	D5185	11.5		-0.87	
1435	D5185	12.028		-0.60	
1495		12.2		-0.51	
1648	D5185	13.15		-0.02	
1720	D5708	11.152		-1.05	
1740	D5185	12.4		-0.41	
1743	NF T60-106	12.6		-0.30	
1807	D5185	15.3		1.09	
1850	In house	<5		<-4.21	possibly a false negative test result?
1854	D5185	14.1		0.47	
1900	D5185	12.82		-0.19	
2133		11.818		-0.70	
6002	D5185	11.6		-0.82	
6016	D6595	15.6		1.24	
6043	D5185	16		1.45	
6044	D5185	15		0.93	
6059	D5185	13.64		0.23	
6080	D5185	13.9		0.37	
6322	DIN51418	12		-0.61	
6414	D5185	10.224		-1.52	
6441	D5185	12.83		-0.18	
6464		-----		-----	

normality	OK
n	57
outliers	1
mean (n)	13.188
st.dev. (n)	1.6969
R(calc.)	4.751
st.dev.(D5185:18)	1.9455
R(D5185:18)	5.447

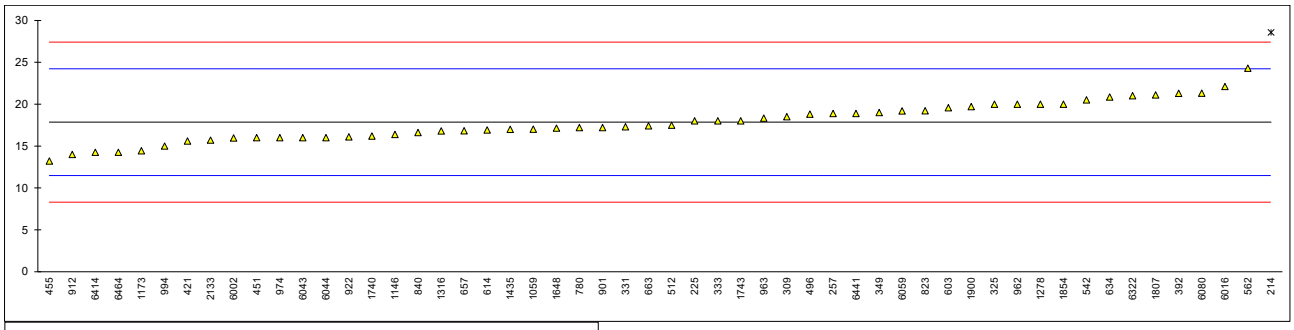


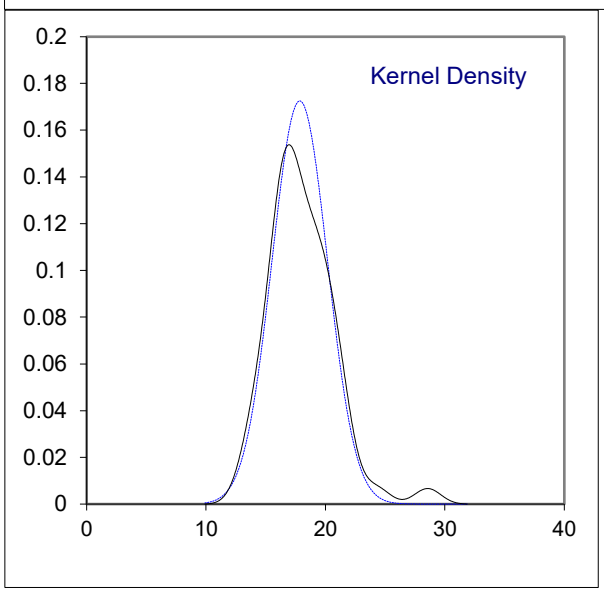


Determination of Silicon as Si on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	28.56	R(0.01)	3.36	
225	D6595	18		0.05	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257	D6595	18.87		0.32	
309	D5185	18.5		0.20	
325	D5185	20		0.67	
331	D5185Mod.	17.3		-0.17	
333	D5185	18		0.05	
349	D5185	19		0.36	
381		-----		-----	
392		21.2819		1.07	
421	D5185	15.6		-0.71	
451	D5185	16		-0.58	
455	D5185	13.22		-1.45	
496	D5185	18.8		0.30	
512	D5185	17.48		-0.12	
542	D6595	20.5		0.83	
562	D6595	24.3		2.02	
603	D5185	19.56		0.53	
614	D5185	16.91		-0.30	
633		-----		-----	
634	D6595	20.86		0.94	
657	D5185	16.82		-0.33	
663	D5185	17.4		-0.14	
780	D5185	17.2		-0.21	
823	D5185	19.2		0.42	
840	D5185	16.6		-0.39	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D5185	17.20		-0.21	
912	D5185	14		-1.21	
922	D5185	16.1		-0.55	
962	D5185	20.0		0.67	
963	D5185	18.33		0.15	
974	D5185	16		-0.58	
994	D5185	15		-0.90	
1059	In house	17		-0.27	
1146	In house	16.38		-0.46	
1173	In house	14.43		-1.07	
1278	D5185	20		0.67	
1316	D5185	16.8		-0.33	
1435	D5185	16.990		-0.27	
1495		-----		-----	
1648	D5185	17.13		-0.23	
1720		-----		-----	
1740	D5185	16.2		-0.52	
1743	NF T60-106	18		0.05	
1807	D5185	21.1		1.02	
1850		-----		-----	
1854	D5185	20.0		0.67	
1900	D5185	19.70		0.58	
2133		15.694		-0.68	
6002	D5185	15.96		-0.59	
6016	D6595	22.1		1.33	
6043	D5185	16		-0.58	
6044	D5185	16		-0.58	
6059	D5185	19.19		0.42	
6080	D5185	21.3		1.08	
6322	DIN51418	21	C	0.99	first reported 26
6414	D5185	14.246		-1.13	
6441	D5185	18.87		0.32	
6464	D5185	14.25		-1.13	

normality	OK
n	53
outliers	1
mean (n)	17.856
st.dev. (n)	2.3139
R(calc.)	6.479
st.dev.(D5185:18)	3.1874
R(D5185:18)	8.925



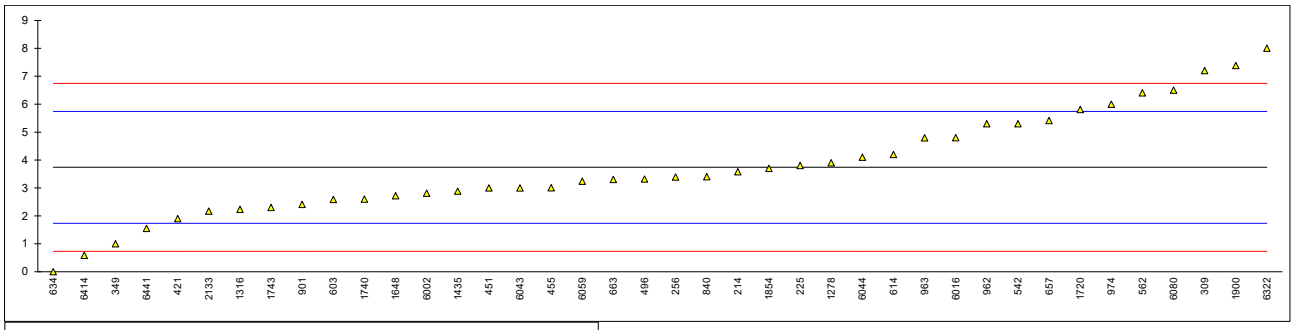


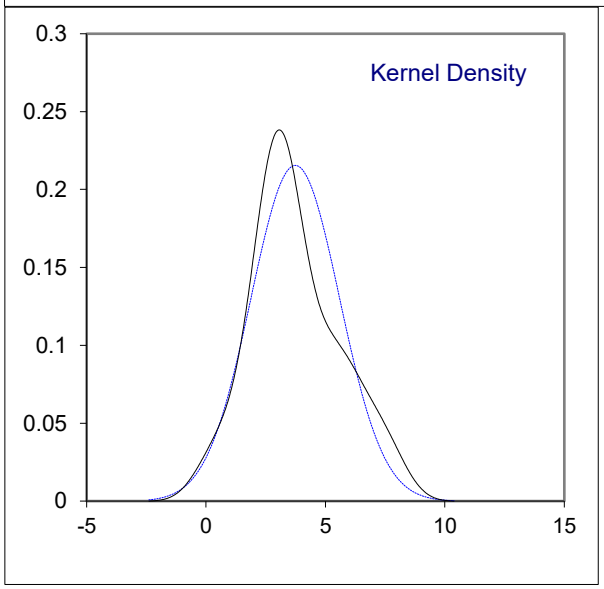
Determination of Sodium as Na on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	3.58		-0.16	
225	D6595	3.8		0.06	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256	In house	3.39		-0.35	
257		-----		-----	
309	D5185	7.2		3.45	
325	D5185	<2		-----	
331	D5185Mod.	<2		-----	
333	D5185	<7		-----	
349	D5185	1		-2.73	
381		-----		-----	
392		-----		-----	
421	D5185	1.9		-1.84	
451	D5185	3		-0.74	
455	D5185	3.009667	C	-0.73	first reported 10.565
496	D5185	3.32		-0.42	
512		-----		-----	
542	D6595	5.3		1.56	
562	D6595	6.4		2.65	
603	D5185	2.588		-1.15	
614	D5185	4.2		0.46	
633		-----		-----	
634	D6595	0.0		-3.73	
657	D5185	5.41		1.67	
663	D5185	3.30		-0.44	
780	D5185	<7.0		-----	
823	D5185	<6		-----	
840	D5185	3.40		-0.34	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	<7.0		-----	
901	D5185	2.41		-1.33	
912		-----		-----	
922	D5185	<7.0		-----	
962	D5185	5.3		1.56	
963	D5185	4.79		1.05	
974	D5185	6		2.26	
994	D5185	<7		-----	
1059		-----		-----	
1146	In house	<4		-----	
1173		-----		-----	
1278	D5185	3.9		0.16	
1316	D5185	2.23		-1.51	
1435	D5185	2.88		-0.86	
1495		-----		-----	
1648	D5185	2.72		-1.02	
1720	D5708	5.810		2.07	
1740	D5185	2.6		-1.14	
1743	NF T60-106	2.3		-1.44	
1807		-----		-----	
1850		-----		-----	
1854	D5185	3.7		-0.04	
1900	D5185	7.38		3.63	
2133		2.172		-1.56	
6002	D5185	2.81		-0.93	
6016	D6595	4.8		1.06	
6043	D5185	3		-0.74	
6044	D5185	4.1		0.36	
6059	D5185	3.24		-0.50	
6080	D5185	6.5		2.75	
6322	DIN51418	8		4.25	
6414	D5185	0.588		-3.14	
6441	D5185	1.55	C	-2.18	first reported 15.52
6464		-----		-----	

normality	OK
n	40
outliers	0
mean (n)	3.739
st.dev. (n)	1.8514
R(calc.)	5.184
st.dev.(D5185:18)	1.0021
R(D5185:18)	2.806

application range: 7 – 70 mg/kg

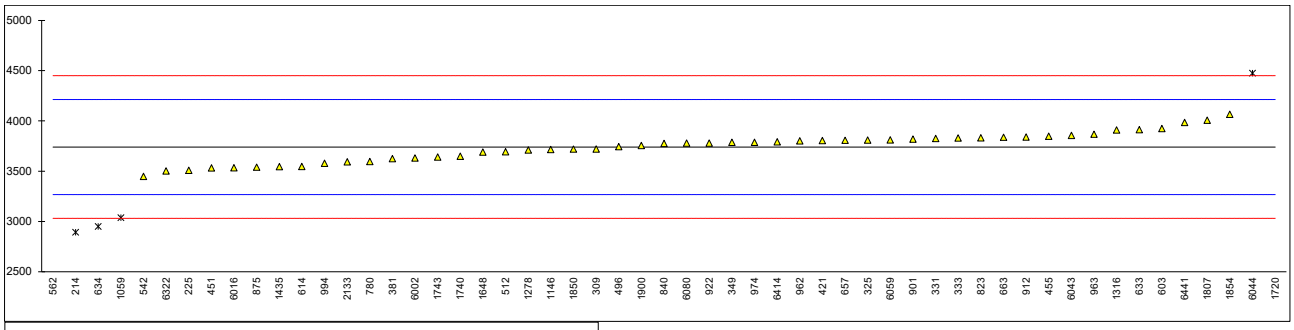


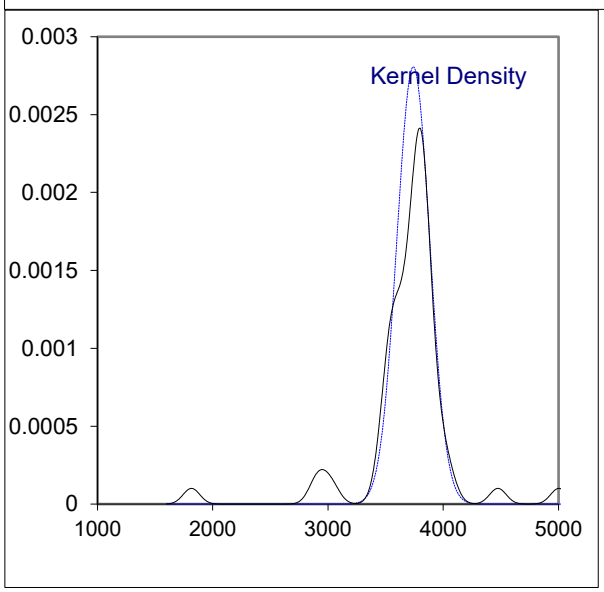


Determination of Calcium as Ca on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	2892	R(0.01)	-3.59	
225	D6595	3507		-0.99	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257		-----		-----	
309	D5185	3721		-0.08	
325	D5185	3810		0.29	
331	D5185Mod.	3824.7		0.35	
333	D5185	3830		0.38	
349	D5185	3787		0.20	
381	D5185	3624		-0.49	
392		-----		-----	
421	D5185	3804		0.27	
451	D5185	3532		-0.88	
455	D5185	3847.467	C	0.45	first reported 0.706417
496	D5185	3743	C	0.01	first reported 3189.9
512	D5185	3694		-0.20	
542	D6595	3446.9		-1.24	
562	D6595	1816	R(0.01)	-8.14	
603	D5185	3923		0.77	
614	D5185	3547		-0.82	
633	D6595	3912.8		0.73	
634	D6595	2950	C,R(0.01)	-3.34	first reported 2550
657	D5185	3807	C	0.28	first reported 4140
663	D5185	3837		0.41	
780	D5185	3595		-0.62	
823	D5185	3831		0.38	
840	D5185	3775		0.14	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	3540		-0.85	
901	D5185	3819		0.33	
912	D5185	3840		0.42	
922	D5185	3780		0.17	
962	D5185	3801		0.25	
963	D5185	3867.58		0.54	
974	D5185	3788		0.20	
994	D5185	3579		-0.68	
1059	In house	3038	R(0.01)	-2.97	
1146	In house	3714.2		-0.11	
1173		-----		-----	
1278	D5185	3710		-0.13	
1316	D5185	3910		0.72	
1435	D5185	3546.125		-0.82	
1495		-----		-----	
1648	D5185	3690.8		-0.21	
1720	D5708	5004.2	C,R(0.01)	5.34	first reported 715.076
1740	D5185	3648		-0.39	
1743	NF T60-106	3640		-0.43	
1807	D5185	4007	C	1.13	first reported 4142
1850	In house	3720		-0.09	
1854	D5185	4065		1.37	
1900	D5185	3755.60		0.06	
2133		3591.980		-0.63	
6002	D5185	3631		-0.46	
6016	D6595	3533	C	-0.88	first reported 3292.4
6043	D5185	3856		0.49	
6044	D5185	4475	R(0.01)	3.10	
6059	D5185	3812		0.30	
6080	D5185	3779		0.16	
6322	DIN51418	3501		-1.01	
6414	D5185	3791.950		0.22	
6441	D5185	3983		1.02	
6464		-----		-----	

normality	OK
n	49
outliers	6
mean (n)	3740.80
st.dev. (n)	142.204
R(calc.)	398.17
st.dev.(D5185:18)	236.476
R(D5185:18)	662.13

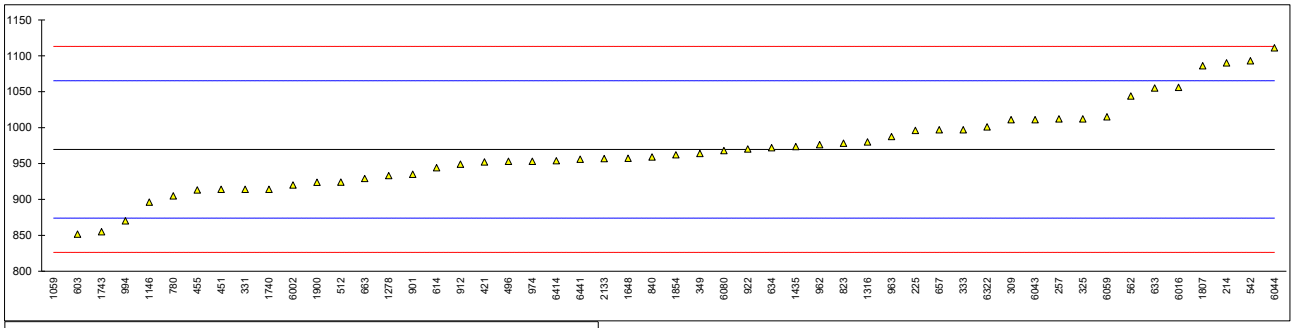


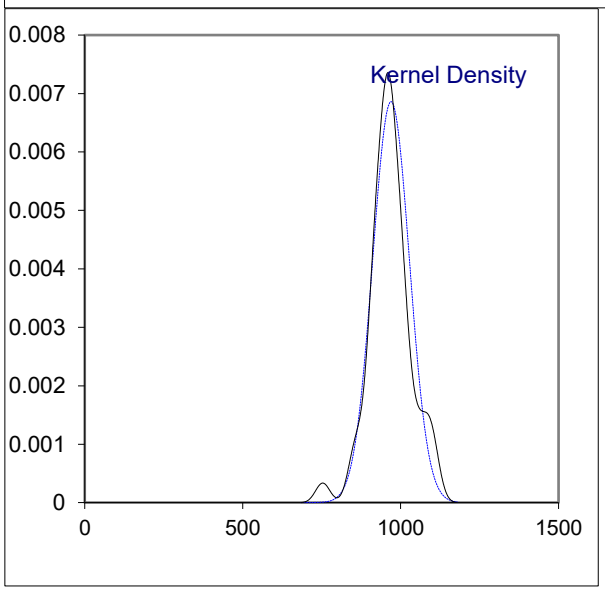


Determination of Phosphorus as P on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	1090		2.52	
225	D6595	996		0.55	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256		-----		-----	
257	D6595	1012		0.89	
309	D5185	1011		0.87	
325	D5185	1012		0.89	
331	D5185Mod.	914		-1.16	
333	D5185	997		0.57	
349	D5185	964		-0.12	
381		-----		-----	
392		-----		-----	
421	D5185	952		-0.37	
451	D5185	914		-1.16	
455	D5185	913.114	C	-1.18	first reported 0
496	D5185	952.9		-0.35	
512	D5185	924		-0.95	
542	D6595	1093		2.58	
562	D6595	1044		1.56	
603	D5185	851.5		-2.47	
614	D5185	944		-0.54	
633	D6595	1055.1		1.79	
634	D6595	972		0.05	
657	D5185	997		0.57	
663	D5185	929		-0.85	
780	D5185	905		-1.35	
823	D5185	978		0.18	
840	D5185	959		-0.22	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875		-----		-----	
901	D5185	935		-0.72	
912	D5185	949		-0.43	
922	D5185	970		0.01	
962	D5185	976.3		0.14	
963	D5185	987.46		0.37	
974	D5185	953		-0.35	
994	D5185	870		-2.08	
1059	In house	753	R(0.05)	-4.53	
1146	In house	896.2		-1.53	
1173		-----		-----	
1278	D5185	933		-0.77	
1316	D5185	980		0.22	
1435	D5185	973.414		0.08	
1495		-----		-----	
1648	D5185	957.2		-0.26	
1720		-----		-----	
1740	D5185	914		-1.16	
1743	NF T60-106	855		-2.40	
1807	D5185	1086		2.43	
1850		-----		-----	
1854	D5185	962		-0.16	
1900	D5185	923.69		-0.96	
2133		956.807		-0.27	
6002	D5185	920		-1.04	
6016	D6595	1055.9		1.80	
6043	D5185	1011		0.87	
6044	D5185	1111		2.96	
6059	D5185	1015		0.95	
6080	D5185	968		-0.03	
6322	DIN51418	1001		0.66	
6414	D5185	953.861		-0.33	
6441	D5185	955.9		-0.29	
6464		-----		-----	

normality	OK
n	51
outliers	1
mean (n)	969.60
st.dev. (n)	58.164
R(calc.)	162.86
st.dev.(D5185:18)	47.820
R(D5185:18)	133.89

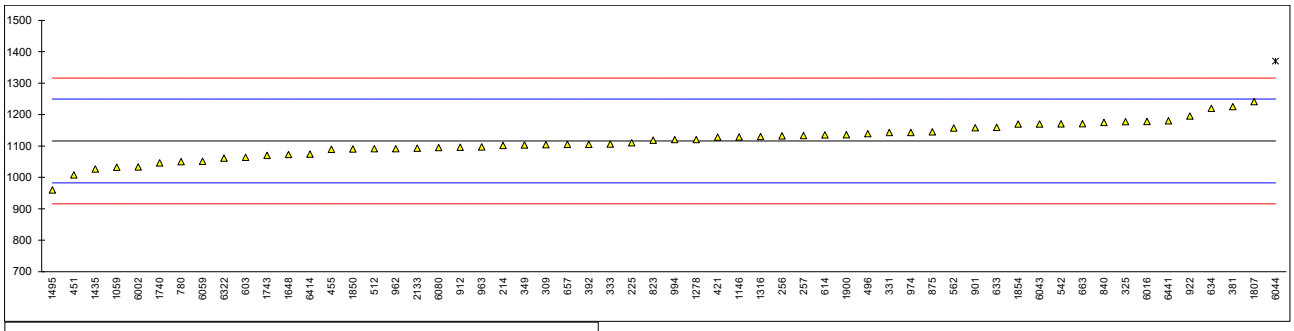


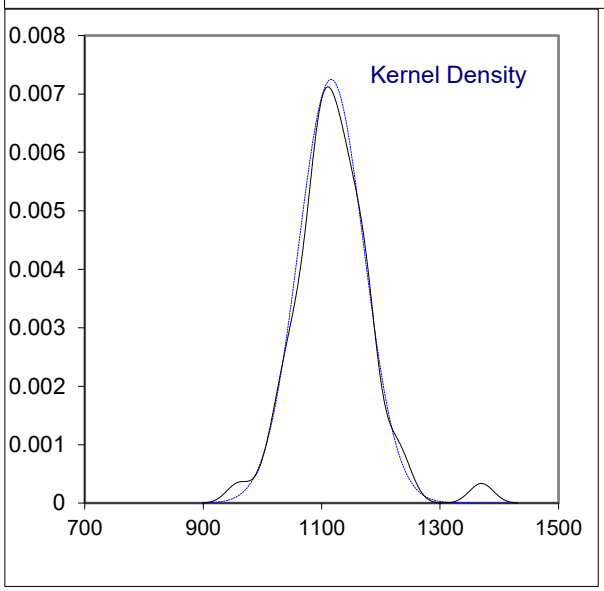


Determination of Zinc as Zn on sample #22087; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
214	D6595	1102		-0.21	
225	D6595	1110		-0.09	
235		-----		-----	
237		-----		-----	
254		-----		-----	
256	In house	1132.29		0.24	
257	D6595	1133		0.25	
309	D5185	1104		-0.18	
325	D5185	1177		0.91	
331	D5185Mod.	1142.7		0.40	
333	D5185	1106		-0.15	
349	D5185	1103		-0.20	
381	D5185	1225		1.63	
392		1105.2857		-0.16	
421	D5185	1128		0.18	
451	D5185	1008		-1.62	
455	D5185	1089.43		-0.40	
496	D5185	1139	C	0.34	first reported 946.7
512	D5185	1091		-0.38	
542	D6595	1170.6		0.82	
562	D6595	1157		0.61	
603	D5185	1064		-0.78	
614	D5185	1135		0.28	
633	D6595	1159.1		0.64	
634	D6595	1220		1.56	
657	D5185	1105		-0.17	
663	D5185	1171		0.82	
780	D5185	1050		-0.99	
823	D5185	1118		0.03	
840	D5185	1175		0.88	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D5185	1145		0.43	
901	D5185	1158		0.63	
912	D5185	1096		-0.30	
922	D5185	1195		1.18	
962	D5185	1091		-0.38	
963	D5185	1096.72		-0.29	
974	D5185	1143		0.40	
994	D5185	1120		0.06	
1059	In house	1032		-1.26	
1146	In house	1128.3		0.18	
1173		-----		-----	
1278	D5185	1120		0.06	
1316	D5185	1130		0.21	
1435	D5185	1026.963		-1.34	
1495		959.9		-2.34	
1648	D5185	1072.7		-0.65	
1720		-----		-----	
1740	D5185	1046		-1.05	
1743	NF T60-106	1070		-0.69	
1807	D5185	1241		1.87	
1850	In house	1090		-0.39	
1854	D5185	1170		0.81	
1900	D5185	1135.50		0.29	
2133		1093.134		-0.35	
6002	D5185	1033		-1.25	
6016	D6595	1178.1		0.93	
6043	D5185	1170		0.81	
6044	D5185	1370	R(0.01)	3.80	
6059	D5185	1051		-0.98	
6080	D5185	1095		-0.32	
6322	DIN51418	1061		-0.83	
6414	D5185	1074.150		-0.63	
6441	D5185	1180		0.96	
6464		-----		-----	

normality	OK
n	57
outliers	1
mean (n)	1116.19
st.dev. (n)	55.032
R(calc.)	154.09
st.dev.(D5185:18)	66.747
R(D5185:18)	186.89





APPENDIX 2

Other reported test results on sample #22087

lab	Ba	Cd	Li	Mn	K	Ag	Sn	Ti	V
178	-----	-----	-----	-----	-----	-----	-----	-----	-----
179	-----	-----	-----	-----	-----	-----	-----	-----	-----
214	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.83	0.12
225	0.0	0.0	-----	0.0	0.7	0.0	0.0	0.0	0.4
235	-----	-----	-----	-----	-----	-----	-----	-----	-----
237	-----	-----	-----	-----	-----	-----	-----	-----	-----
254	0.04	-----	-----	0.220	-----	-----	-----	-----	-----
256	-----	-----	-----	-----	-----	0.0	-----	-----	-----
257	0.14	0.40	0.03	0.2	0.62	0.0	1.54	0.0	1.17
309	<2	<2	<2	<2	<2	<2	4.6	<2	<2
325	<1	<1	2	<1	<2	<1	<1	<1	<1
331	<2	0	<2	<2	<2	<2	<2	<2	<2
333	<0.5	-----	-----	<5	<40	<0.5	<10	<5	<1
349	0	0	1	0	0	0	5	0	1
381	-----	-----	-----	-----	-----	-----	-----	-----	-----
392	-----	-----	-----	-----	-----	-----	-----	-----	-----
421	<1,0	<1,0	-----	<1,0	<1,0	<1,0	3.7	<1,0	<1,0
451	-----	-----	-----	-----	-----	-----	-----	-----	-----
455	***0.122986***	***0***	0	***0***	2.895	***0.088094***	***1.357***	***0.279775***	1.102
496	0.02	0.11	0.34	0.50	0.91	0.15	4.11	0.45	<0.1
512	<0.5	-----	-----	<5	<40	<0.5	<10	<5	<1
542	0.001	-----	-----	-----	0.7	0	1.9	0	0.89
562	<1	-----	-----	-----	2.0	<1	<1	<1	<1
603	0.731	-----	-----	0.324	2.969	0.484	<1	0.298	<1
614	<1	<1	<1	<1	5.4	<1	<1	<1	<1
633	0.030	0.083	0.030	0.279	0.680	0.027	0	0.248	0.410
634	0.0	-----	-----	0.31	0.88	0.0	0.0	0.22	0.23
657	<1	<1	<1	<1	<1	<1	2.84	<1	<1
663	0.03	-----	-----	0.26	-----	0.02	1.03	0.00	0.00
780	<1.00	<1.0	-----	<5.0	<40	<1.0	<10	<5.0	<1.0
823	<1	<1	<1	<1	<3	<1	<3	<1	<1
840	<0.5	<1	-----	<5	<5	<0.5	<5	<5	<1
862	-----	-----	-----	-----	-----	-----	-----	-----	-----
863	-----	-----	-----	-----	-----	-----	-----	-----	-----
864	-----	-----	-----	-----	-----	-----	-----	-----	-----
875	<1	<1	-----	<5.0	-----	<1	<10	<5.0	<1.0
901	-----	-----	-----	<5	<40	-----	<10	<5	<1
912	<1	<1	-----	<1	-----	<1	4	<1	<1
922	<0.5	<1.0	<1.0	<5.0	<40	<0.5	<10.0	<5.0	<1.0
962	<0.1	-----	-----	0.34	<0.1	<0.1	<0.1	<0.1	<0.1
963	<0.10	0.12	<0.10	0.29	<0.10	<0.10	0.98	0.23	<0.10
974	<1	<1	<1	<1	<1	<1	<1	<1	<1
994	<0.5	<1	-----	<5	<40	<0.5	<10	<5	<1
1059	-----	-----	-----	-----	-----	-----	<8	-----	-----
1146	<5	-----	<1	<1	-----	<1	5.234	<1	<1
1173	0.09	-----	-----	0.26	-----	-----	-----	-----	-----
1278	<0.02	<0.1	-----	0.14	<2.4	<0.07	6.2	<0.3	<0.03
1316	<0.01	0.06	-----	0.19	<1.5	<0.05	4.03	0.22	<0.05
1435	<1	<1	<1	<1	<1	<1	<1	<1	<1
1495	-----	0.3	-----	0.4	-----	-----	1.4	-----	0.4
1648	-----	-----	-----	-----	-----	-----	0.78	-----	0.06
1720	-----	-----	-----	-----	-----	-----	-----	-----	0.475
1740	<1	-----	<1	<1	<1	<1	<1	<1	<1
1743	0.06	0.1	0	0.3	0.6	0	0.8	0.2	0
1807	<1	<1	-----	2.0	-----	<1	5.7	<1	<1
1850	<10	<5	-----	<3	-----	<3	<3	<50	<3
1854	-----	-----	-----	0.2	-----	-----	-----	0.3	0.1
1900	-----	-----	-----	-----	-----	1.91	-----	0.29	-----
2133	0.020	0.078	-----	0.224	-----	0.097	0.389	0.504	-0.235
6002	0	0	0	0.284	0.21	0.248	0.974	0.282	0.0274
6016	<1	<1	<1	<1	<1	-----	<1	1.1	1.2
6043	0	-----	-----	-----	-----	-----	4	-----	-----
6044	0	0	0.2	0.16	0	0	0	0.3	0
6059	Not detect.	Not detect.	Not detect.	Not detect.	0.677	Not detect.	0.5	Not detect.	Not detect.
6080	0.3	<1	-----	<1	4.9	<1	4.4	0.3	0.9
6322	<2	<2	-----	<1	<1	<3	2	<1	<1
6414	***0.0***	***0.0***	-1.646	***0.0***	***0.0***	***0.0***	-2.192	***0.0***	***0.0***
6441	0.967	< 0.001	-----	< 0.001	-----	< 0.001	< 0.001	< 0.001	< 0.001
6464	-----	-----	-----	-----	7.638	-----	-----	-----	-----

Results bold, Italic and underline:

lab 455 first reported Ba 41.943, Cd 3627.39, Mn 29.64, Ag 865.498, Sn 6883.57, Ti -2.488

lab 6414 first reported Ba -4.629, Cd -1.888, Mn -1.65, K -1.985, Ag -1.985, Ti -1.763, V -2.488

APPENDIX 3

Number of participants per country

1 lab in ALGERIA
1 lab in ARGENTINA
1 lab in AUSTRALIA
1 lab in AZERBAIJAN
2 labs in BELGIUM
1 lab in BOTSWANA
1 lab in CHILE
3 labs in CHINA, People's Republic
2 labs in COTE D'IVOIRE
1 lab in CROATIA
1 lab in CZECH REPUBLIC
2 labs in DENMARK
3 labs in FRANCE
2 lab in GERMANY
4 labs in GREECE
1 lab in INDIA
1 lab in IRELAND
2 labs in ITALY
1 lab in KAZAKHSTAN
1 lab in KENYA
2 labs in KOREA, Republic of
4 labs in MALAYSIA
1 lab in MAURITIUS
1 lab in MOROCCO
3 labs in NETHERLANDS
1 lab in NIGERIA
3 labs in NORWAY
1 lab in PAKISTAN
1 lab in PERU
2 labs in PHILIPPINES
2 labs in POLAND
2 labs in RUSSIAN FEDERATION
2 labs in SAUDI ARABIA
1 lab in SERBIA
1 lab in SINGAPORE
1 lab in SLOVENIA
5 labs in SPAIN
1 lab in SUDAN
1 lab in SWEDEN
2 labs in TANZANIA
1 lab in THAILAND
1 lab in TURKEY
2 labs in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM
2 labs in UNITED STATES OF AMERICA
1 lab in VIETNAM

APPENDIX 4

Abbreviations

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

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO5725:86
3 ISO5725 parts 1-6:94
4 ISO13528:05
5 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
6 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
7 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
8 J.N. Miller, Analyst, 118, 455, (1993)
9 Analytical Methods Committee, Technical Brief, No 4, January 2001
10 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364, (2002)
11 W. Horwitz and R. Albert, J. AOAC Int, 79.3, 589-621, (1996)
12 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983)