Results of Proficiency Test
Engine Oil (used)
June 2020

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1997 a proficiency test for used Engine Oil (Lubricating Oil) is organized by the Institute for Interlaboratory Studies (iis) every year. During the annual proficiency testing program 2019/2020 it was decided to continue the round robin for the analysis of used Engine Oil in accordance with the latest version of SAE and ASTM D4485.

In this interlaboratory study 77 laboratories from 46 different countries registered for participation for the Regular round and 70 laboratories from 43 different countries registered for participation for the Metals round. In total 79 participants from 47 different countries registered for participation for one or both proficiency tests. See appendix 2 for the number of participants per country. In this report the results of the proficiency test on used Engine Oil 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, depending on the registration, to send one bottle of 0.5 L of used Engine Oil labelled #20076 and one bottle of 50 mL labelled #20077 especially for wear metals analyzes. 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

A batch of approximately 200 L of used Engine Oil was obtained from a third-party laboratory. After homogenization 107 amber glass bottles of 0.5 L were filled and labelled #20076. 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 #20076-1	0.89385
Sample #20076-2	0.89385
Sample #20076-3	0.89385
Sample #20076-4	0.89385
Sample #20076-5	0.89385
Sample #20076-6	0.89384
Sample #20076-7	0.89384
Sample #20076-8	0.89385

Table 1: homogeneity test results of subsamples #20076

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)	0.00001
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 2: evaluation of the repeatability of the subsamples #20076

The calculated repeatability was less than 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples was assumed.

A batch of approximately 5 L of used Engine Oil was obtained from a third-party laboratory. This batch was made positive with certain wear metals. After homogenization 100 PE bottles of 50 mL were filled and labelled #20077. The homogeneity of the subsamples was checked by determination of Nickel and Copper in accordance with ASTM D5185 on 8 stratified randomly selected subsamples.

	Nickel in mg/kg	Copper in mg/kg
Sample #20077-1	28	51
Sample #20077-2	29	52
Sample #20077-3	29	53
Sample #20077-4	29	53
Sample #20077-5	29	52
Sample #20077-6	29	52
Sample #20077-7	29	52
Sample #20077-8	29	52

Table 3: homogeneity test results of subsamples #20077

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.

	Nickel in mg/kg	Copper in mg/kg
r (observed)	0.99	1.79
reference test method	ASTM D5185:18	ASTM D5185:18
0.3 x R (reference test method)	2.42	3.75

Table 4: evaluation of repeatabilities of the subsamples #20077

The calculated repeatabilities were less than 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 May 13, 2020. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Engine Oil packed in the 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 #20076: 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 at 40°C and 100°C, Viscosity Index, Kinematic Viscosity Houillon at 40°C and 100°C and Water. Also, some extra questions were asked about the determination of Total Acid Number.

The participants were requested to determine 23 elements, wear metals, on sample #20077: Al, Ba, B, Cd, Cr, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Si, Ag, Na, Sn, Ti, V, Ca, P and 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 participants were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after the deadline a reminder was sent to those laboratories that had not reported test results at that moment. Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyzes). Additional or corrected test results are used for data analysis and original test results are placed under 'Remarks' in the test result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report ‘iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation’ of June 2018 (iis-protocol, version 3.5).
For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as ‘<…’ or ‘>…’ were not used in the statistical evaluation.
First, the normality of the distribution of the various data sets per determination was checked by means of the Lilliefors-test, a variant of the Kolmogorov-Smirnov test and by the calculation of skewness and kurtosis. Evaluation of the three normality indicators in combination with the visual evaluation of the graphic Kernel density plot, lead to judgement of the normality being either ‘unknown’, ‘OK’, ‘suspect’ or ‘not OK’. After removal of outliers, this check was repeated. If a data set does not have a normal distribution, the (results of the) statistical evaluation should be used with due care.

According to ISO5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. In this PT, the criterion of ISO13528, paragraph 9.2.1. 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 was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

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

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. In some cases, a reproducibility based on former iis proficiency tests could be used.
When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used, this in order to evaluate whether the reported test result is fit-for-use.

The z-scores were calculated according to:

$z_{(target)}$ = (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.
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 interlaboratory study some problems were encountered with the dispatch of the samples due to the COVID-19 pandemic. Therefore, the reporting time on the data entry portal was extended with another three weeks. When considering both rounds ten participants did not report any test results and seven other participants reported the test results after the reporting deadline. Not all participants were able to report all tests requested. Finally, 69 reporting laboratories submitted 1583 numerical test results. Observed were 46 outlying test results, which is 2.9%. In proficiency studies outlier percentages of 3% - 7.5% are quite normal.

Not all original data sets proved to have a normal Gaussian distribution. These are referred to as “not OK” or “suspect”. The statistical evaluation of these data sets should be used with due care, 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 reported test results in appendix 1. The abbreviations, used in these tables, are explained in appendix 3.

In the iis PT reports, ASTM methods are referred to with a number (e.g. D2270) and an added designation for the year that the method was adopted or revised (e.g. D2270:10). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D2270:10(2016)). In the results tables of appendix 1 only the method number and year of adoption or revision (e.g. D2270:10) will be used.

Unfortunately, a suitable reference test method, providing the precision data, is not available for all determinations. For the tests that have no available precision data, the calculated reproducibility was compared against the reproducibility estimated from the Horwitz equation. With the evaluation of wear metals the test results of a laboratory with multiple outliers will be excluded because the measurements of wear metals are related.

Sample #20076

Total Acid Number: This determination may be problematic depending on the mode of the test method used. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is almost in agreement with the requirements of ASTM D664-A:18e2, BEP pH=10 and 60 mL of titration solvent used, but not in agreement with the stricter requirements of ASTM D664-A:18e2, BEP pH=10 and 125 mL and IP 60 mL and 125 mL. When evaluated separately for the type of end point the calculated reproducibility of the group using BEP is in agreement with the requirements of ASTM D664-A:18e2 at 60 mL titration solvent. But for BEP at 125 mL titration solvent and IP at both titration volumes it is still not in agreement with the requirements of ASTM D664-A:18e2.
It is observed that four participants reported to have used pH 11 for BEP. Please note that in method ASTM D664-A version 2018e2 the Buffer End Point has been changed to pH 10. Furthermore, it is remarkable that IP has been used for a used oil. Test method ASTM D664-A advises to use BEP for used oils.

Base Number ($HClO_4$): 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 D2896:15 procedure A forward titration.
When the forward titration test results of ASTM D2896 were evaluated separately for procedure A and B the calculated reproducibilities are in full agreement with the respective requirements of procedures A or B of the ASTM D2896:15 forward titration.

Base Number (HCl): 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 D4739:17.

Density at 15°C: This determination may be problematic for a number of laboratories. Eight statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ISO12185:96.

Flash Point PMcc: Procedures A and B were evaluated separately because there is a bias between both procedures.
Procedure A and other test methods: This determination was problematic. One statistical outlier was observed and one other test result was excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D93:20, procedure A.
Procedure B: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D93:20, procedure B.

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

Kinematic Viscosity at 40°C: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:19a.

Kinematic Viscosity at 100°C: 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 D445:19a.

Viscosity Index: This determination was problematic. No statistical outliers were observed but two test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D2270:10(2016).

Kinematic Viscosity Houillon at 40°C: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D7279:18.

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 D7279:18.

Water: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D6304:16e1.

Sample #20077

Aluminum: This determination was not problematic. Two statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Barium: This determination was not problematic. Five statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Boron: This determination was very problematic. One statistical outlier was observed and two other test results were excluded. The calculated reproducibility after rejection of the suspect data is not at all in agreement with the estimated reproducibility using the Horwitz equation, nor with the requirements of ASTM D5185:18. The Horwitz equation was used to

evaluate because average group result of 450 mg/kg was far above the application range of 4-30 mg/kg of ASTM D5185:18.

Cadmium: This determination was not problematic. One statistical outlier was observed and two other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the estimated reproducibility using the Horwitz equation.

Chromium: This determination was problematic. No statistical outliers were observed but three test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D5185:18.

Copper: This determination was not problematic. No statistical outliers were observed but three test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of ASTM D5185:18.

Iron: This determination was not problematic. One statistical outlier was observed and two other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Lead: This determination was not problematic. One statistical outlier was observed and two other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

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

Magnesium: This determination was not problematic. No statistical outliers were observed but two test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of ASTM D5185:18.

Manganese: This determination was not problematic. One statistical outlier was observed and three other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of ASTM D5185:18.

Molybdenum: This determination was problematic. One statistical outlier was observed and two other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D5185:18.

Nickel: This determination was not problematic. Two statistical outliers were observed and two other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Potassium: This determination may not be problematic. All reporting laboratories agreed on a value <40 mg/kg. Therefore, no z-scores were calculated.

Silicon: This determination was not problematic. One statistical outlier was observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of ASTM D5185:18.

Silver: This determination was not problematic. Two statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Sodium: This determination was problematic. No statistical outliers were observed but two test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D5185:18.

Tin: This determination was not problematic. One statistical outlier was observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Titanium: This determination was not problematic. No statistical outliers were observed but two test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Vanadium: This determination was not problematic. No statistical outliers were observed but three test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with the requirements of ASTM D5185:18.

Calcium: This determination was problematic. No statistical outliers were observed but three test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ASTM D5185:18.

Phosphorus: 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 D5185:18.

Zinc: This determination was not problematic. No statistical outliers were observed but three test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of ASTM D5185:18.

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 relevant 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 literature reference test methods (in casu ASTM, ISO test methods) are presented in the next table.

Parameter	unit	n	average	2.8 * sd	R(lit.)
Total Acid Number	mg KOH/g	43	3.47	2.06	1.86
Base Number ($HClO_4$)	mg KOH/g	43	9.23	0.83	0.65
Base Number (HCl)	mg KOH/g	18	7.51	1.25	3.95
Density at 15°C	kg/L	39	0.8938	0.0005	0.0005
Flash Point PMcc – procedure A	°C	30	207.5	17.7	14.7
Flash Point PMcc – procedure B	°C	13	191.3	10.3	10
Fuel Dilution	%M/M	12	0.8	1.7	1.6
Kinematic Viscosity at 40°C	mm^2/s	54	114.84	1.80	2.10
Kinematic Viscosity at 100°C	mm^2/s	52	13.420	0.265	0.150
Viscosity Index		47	113.4	3.3	2
Kinematic Viscosity Houillon at 40°C	mm^2/s	14	114.64	0.98	3.44
Kinematic Viscosity Houillon at 100°C	mm^2/s	16	13.485	0.344	0.755
Water	mg/kg	42	402	426	617

Table 5: reproducibilities of tests on sample #20076

Element	unit	n	average	2.8 * sd	R(lit.)
Aluminum as Al	mg/kg	54	29.3	8.1	9.1
Barium as Ba	mg/kg	46	51.0	10.1	22.0
Boron as B	mg/kg	42	450	177	80
Cadmium as Cd	mg/kg	29	27.2	7.3	7.4
Chromium as Cr	mg/kg	54	28.7	7.0	6.3
Copper as Cu	mg/kg	52	50.9	12.3	12.2
Iron as Fe	mg/kg	52	34.2	7.8	8.8

Element	unit	n	average	2.8 * sd	R(lit.)
Lead as Pb	mg/kg	53	28.5	7.4	10.0
Lithium as Li	mg/kg	15	16.5	6.3	4.8
Magnesium as Mg	mg/kg	53	57.0	14.7	16.2
Manganese as Mn	mg/kg	45	29.2	7.8	7.5
Molybdenum as Mo	mg/kg	51	68.8	15.2	12.9
Nickel as Ni	mg/kg	52	28.1	6.6	8.0
Potassium as K	mg/kg	35	<40	n.e.	n.e.
Silicon as Si	mg/kg	54	39.4	12.7	12.2
Silver as Ag	mg/kg	44	28.4	6.1	9.9
Sodium as Na	mg/kg	48	31.9	15.1	12.9
Tin as Sn	mg/kg	50	28.2	8.2	16.7
Titanium as Ti	mg/kg	46	27.7	6.6	11.9
Vanadium as V	mg/kg	52	27.7	5.2	10.8
Calcium as Ca	mg/kg	49	4256	926	783
Phosphorus as P	mg/kg	52	1042	188	139
Zinc as Zn	mg/kg	53	1133	204	190

Table 6: reproducibilities of tests on sample #20077

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 JUNE 2020 WITH PREVIOUS PTS

	June 2020	June 2019	June 2018	June 2017	June 2016
Number of reporting laboratories	69	78	75	77	85
Number of test results	1583	1545	1689	1679	1890
Number of statistical outliers	46	89	63	72	57
Percentage of statistical outliers	2.9%	5.8%	3.7%	4.3%	3.0%

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 against the requirements of the respective reference test methods. The conclusions are given in the following table.

Determination	June 2020	June 2019	June 2018	June 2017	June 2016
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	-	-	-	+/-	--
Kinematic Viscosity Houillon at 40°C	++	++	++	+	++
Kinematic Viscosity Houillon at 100°C	++	++	++	++	++
Water	+	+	+	+	++
Wear Metals	+	+	+	+	+

Table 8: comparison determinations against the reference test method

The following performance categories were used:

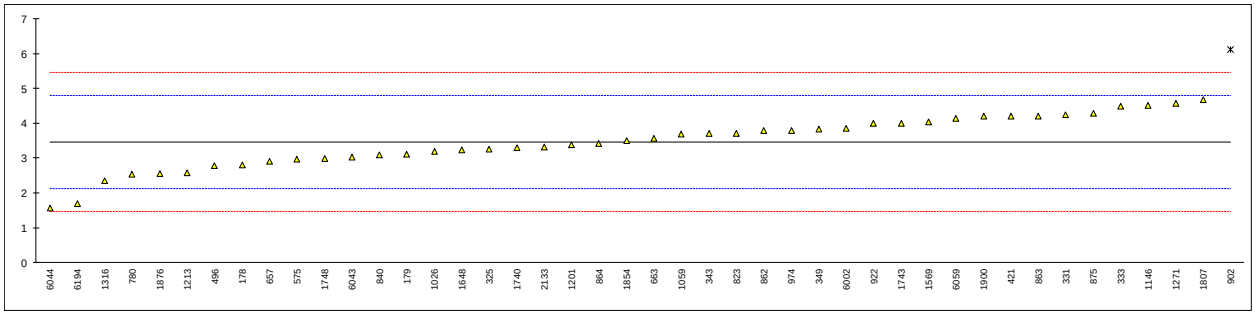
++ : group performed much better than the reference test method
+ : group performed better than the reference test method
+/- : group performance equals the reference test method
- : group performed worse than the reference test method
-- : group performed much worse than the reference test method
n.e.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

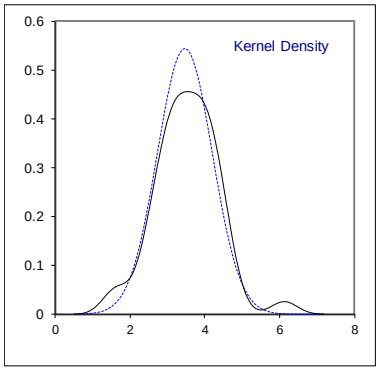
APPENDIX 1

Determination of Total Acid Number on sample #20076; results in mg KOH/g

lab	method	value	mark	z(targ)	end point determination	titration volume	remarks
178	D664-A	2.80		-1.00	Buffer End Point (pH 11)	60 mL	
179	D664-A	3.12		-0.52	Inflection Point	60 mL	
211		-----		-----	---	---	
225		-----		-----	---	---	
230		-----		-----	---	---	
237		-----		-----	---	---	
254		-----		-----	---	---	
255		-----		-----	---	---	
257		-----		-----	---	---	
311		-----		-----	---	---	
325	D664-A	3.26		-0.31	Buffer End Point (pH 10)	125 mL	
331	D664Mod.	4.25		1.18	Inflection Point	60 mL	
333	D664-A	4.5		1.55	Inflection Point	125 mL	
343	D664-A	3.7		0.35	---	---	
349	D664-A	3.83		0.55	Inflection Point	125 mL	
421	ISO6619	4.20		1.10	---	---	
451		-----		-----	---	---	
496	D664-A	2.78		-1.03	Buffer End Point (pH 10)	60 mL	
511		-----		-----	---	---	
512		-----		-----	---	---	
542		-----		-----	---	---	
562		-----		-----	---	---	
575	D664-A	2.96		-0.76	Buffer End Point (pH 10)	60 mL	
614		-----		-----	---	---	
633		-----		-----	---	---	
634		-----		-----	---	---	
657	D664-A	2.9		-0.85	Inflection Point	60 mL	
663	D664-A	3.559		0.14	Buffer End Point (pH 10)	60 mL	
780	D664-A	2.53		-1.41	Buffer End Point (pH 10)	125 mL	
823	D664-A	3.7		0.35	---	---	
840	D664-B	3.10		-0.55	Buffer End Point (pH 10)	60 mL	
862	D664-A	3.79		0.49	Inflection Point	60 mL	
863	D664-A	4.21		1.12	---	60 mL	
864	D664-A	3.43		-0.05	---	60 mL	
875	D664-A	4.28		1.22	---	---	
902	D664-A	6.124	R(0.05)	3.99	Inflection Point	60 mL	
912		-----		-----	---	---	
913		-----		-----	---	---	
922	D664-A	4.0		0.80	Inflection Point	125 mL	
962		-----		-----	---	---	
963		-----		-----	---	---	
974	D664-A	3.80	C	0.50	Inflection Point	125 mL	fr. 5.79
994		-----		-----	---	---	
1023		-----		-----	---	---	
1026	D664-A	3.2		-0.40	Buffer End Point (pH 10)	125 mL	
1059	ISO6619	3.68		0.32	Buffer End Point (pH 11)	60 mL	
1146	D664-A	4.514		1.57	Buffer End Point (pH 11)	125 mL	
1173		-----		-----	---	---	
1201	D664-A	3.37		-0.14	Buffer End Point (pH 10)	125 mL	
1213	D664-A	2.58		-1.33	---	---	
1271	D664-A	4.58		1.67	---	---	
1316	D664-A	2.36		-1.66	---	---	
1318		-----		-----	---	---	
1435		-----		-----	---	---	
1554		-----		-----	---	---	
1569	D664-A	4.03		0.85	Inflection Point	125 mL	
1648	D664-A	3.23		-0.36	Buffer End Point (pH 10)	60 mL	
1740	D664-A	3.30		-0.25	Inflection Point	60 mL	
1743	D664-A	4.0		0.80	Buffer End Point (pH 11)	60 mL	
1748	D664-A	2.985		-0.72	Inflection Point	125 mL	
1807	D664-A	4.68		1.82	Buffer End Point (pH 10)	60 mL	
1850		-----		-----	---	---	
1854	D664-A	3.50		0.05	Inflection Point	125 mL	
1876	D664-A	2.55315		-1.37	Inflection Point	125 mL	
1900	D664-A	4.196		1.10	Inflection Point	60 mL	
1969		-----		-----	---	---	
2133	D664-A	3.3095		-0.24	Buffer End Point (pH 10)	60 mL	
6002	D664-A	3.858		0.59	Buffer End Point (pH 10)	60 mL	
6016		-----		-----	---	---	
6043	D664-A	3.02		-0.67	---	---	
6044	D664-A	1.57		-2.85	Inflection Point	125 mL	
6059	D664-A	4.15		1.03	Inflection Point	125 mL	
6080		-----		-----	---	---	
6115		-----		-----	---	---	
6194	D664-A	1.694		-2.66	Inflection Point	125 mL	
6301		-----		-----	---	---	

lab	method	value	mark	z(targ)	end point determination	titration volume	remarks
6307		-----		-----	---	---	
					BEP pH10 and pH11 only	Inflection Point only	
	normality	OK			OK	OK	
	n	43			16	17	
	outliers	1			0	1	
	mean (n)	3.466			3.427	3.422	
	st.dev. (n)	0.7346			0.6013	0.8614	
	R(calc.)	2.057			1.684	2.412	
	st.dev.(D664-A:18e2)	0.6658	BEP pH=10	60mL	0.6584	---	
	R(D664-A:18e2)	1.864	BEP pH=10	60mL	1.843	---	
Compare							
	R(D664-A:18e2)	1.168	BEP pH=10	125mL	1.154	---	
	R(D664-A:18e2)	1.115	IP	60mL	---	1.103	
	R(D664-A:18e2)	0.800	IP	125mL	---	0.789	



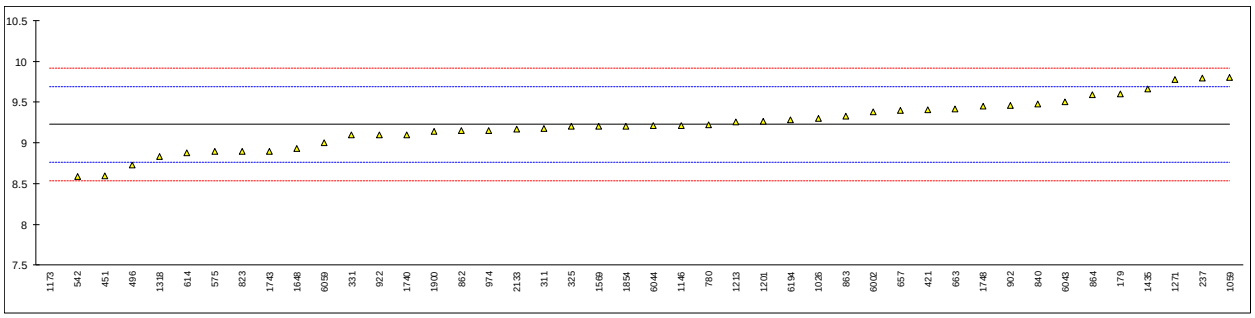


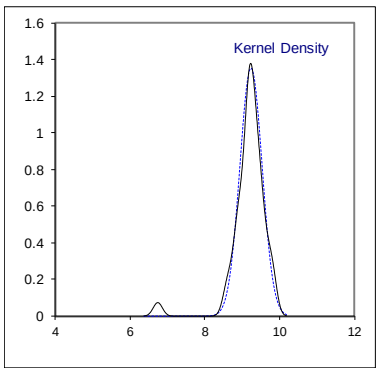
Determination of Base Number ($HClO_4$ titration) on sample #20076; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D2896-A forward	9.60		1.62	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237	D2896-A back	9.794		2.46	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311	D2896-B forward	9.18		-0.20	
325	D2896-B forward	9.2		-0.12	
331	D2896Mod.	9.10		-0.55	
333		-----		-----	
343		-----		-----	
349		-----		-----	
421	ISO3771	9.41		0.79	
451	D2896-B forward	8.6		-2.72	
496	D2896-B back	8.73		-2.15	
511		-----		-----	
512		-----		-----	
542		8.59		-2.76	
562		-----		-----	
575	D2896-A forward	8.9		-1.42	
614	D2896-B forward	8.88		-1.50	
633		-----		-----	
634		-----		-----	
657	D2896-B back	9.4		0.75	
663	D2896-B forward	9.417		0.82	
780	D2896-B forward	9.22		-0.03	
823	D2896-B back	8.9		-1.42	
840	D2896-A forward	9.48		1.10	
862	D2896-B forward	9.15		-0.33	
863	D2896-B	9.33		0.45	
864	D2896-B	9.59		1.57	
875		-----		-----	
902	D2896-B forward	9.46		1.01	
912		-----		-----	
913		-----		-----	
922	D2896-B forward	9.1		-0.55	
962		-----		-----	
963		-----		-----	
974	D2896-A forward	9.15		-0.33	
994		-----		-----	
1023		-----		-----	
1026	D2896-A back	9.3		0.32	
1059	ISO3771	9.8		2.48	
1146	D2896-A forward	9.212		-0.07	
1173	In house	6.75	R(0.01)	-10.74	
1201	D2896-B forward	9.27		0.19	
1213	D2896-B forward	9.26		0.14	
1271	ISO3771	9.78		2.40	
1316		-----		-----	
1318	D2896-A back	8.83		-1.72	
1435	D2896-A forward	9.66		1.88	
1554		-----		-----	
1569	D2896-A forward	9.2		-0.12	
1648	D2896-A back	8.93		-1.29	
1740	D2896-B forward	9.10		-0.55	
1743	D2896-B forward	8.9		-1.42	
1748	D2896-A forward	9.45		0.97	
1807		-----		-----	
1850		-----		-----	
1854	D2896-A back	9.2		-0.12	
1876		-----		-----	
1900	In house	9.144		-0.36	
1969		-----		-----	
2133	D2896-B forward	9.17		-0.25	
6002	ISO3771	9.378		0.65	
6016		-----		-----	
6043	D2896-A back	9.5		1.18	
6044	D2896-A back	9.21		-0.07	
6059	D2896-A forward	9.00		-0.98	
6080		-----		-----	
6115		-----		-----	
6194	D2896-A forward	9.287		0.26	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	

			Only procedure A forward	Only procedure B forward
	normality	OK	OK	suspect
	n	43	10	14
	outliers	1	0	0
	mean (n)	9.227	9.294	9.136
	st.dev. (n)	0.2952	0.2505	0.2224
	R(calc.)	0.827	0.701	0.623
	st.dev.(D2896-A:15) forward 60mL	0.2307	0.2323	0.2284
	R(D2896-A:15) forward 60mL	0.646	0.651	---
Compare				
	R(D2896-A:15) back	2.953	---	---
	R(D2896-B:15) forward	0.646	---	0.640

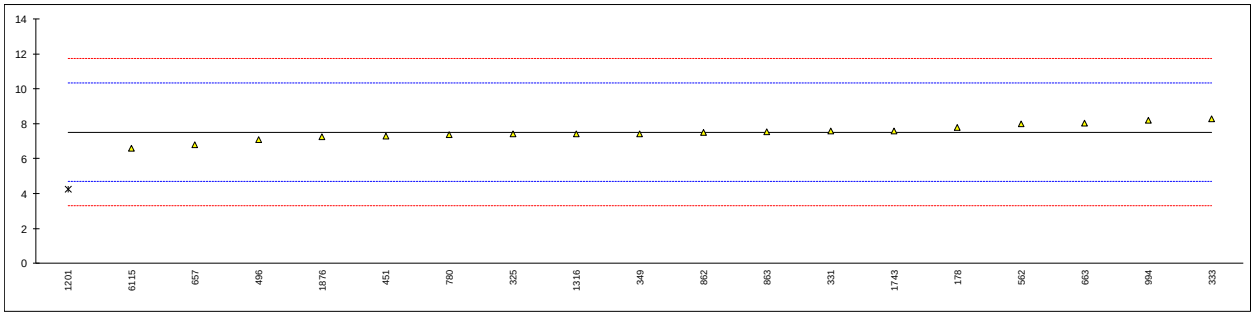


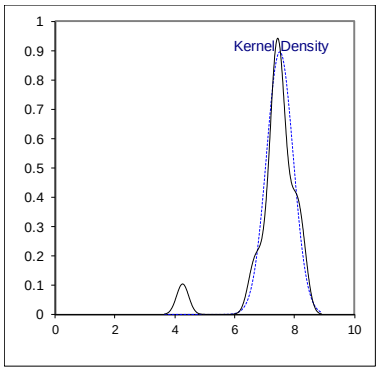


Determination of Base Number (HCl titration) on sample #20076; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
178	D4739	7.8		0.20	
179		-----		-----	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D4739	7.4		-0.08	
331	D4739Mod.	7.60		0.06	
333	D4739	8.3		0.56	
343		-----		-----	
349	D4739	7.42	C	-0.07	first reported as Base Number (HClO4 titration)
421		-----		-----	
451	D4739	7.3		-0.15	
496	D4739	7.09		-0.30	
511		-----		-----	
512		-----		-----	
542		-----		-----	
562	D4739	8		0.35	
575		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D4739	6.8		-0.51	
663	D4739	8.049		0.38	
780	D4739	7.37		-0.10	
823		-----		-----	
840		-----		-----	
862	D4739	7.51		0.00	
863	D4739	7.56		0.03	
864		-----		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D4739	8.18		0.47	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201	D4739	4.27	G(0.01)	-2.30	
1213		-----		-----	
1271		-----		-----	
1316	D4739	7.4		-0.08	
1318		-----		-----	
1435		-----		-----	
1554		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740		-----		-----	
1743	D4739	7.6		0.06	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1876	D4739	7.257		-0.18	
1900		-----		-----	
1969		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6080		-----		-----	
6115	D4739	6.6		-0.65	
6194		-----		-----	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	
	normality	OK			
	n	18			
	outliers	1			
	mean (n)	7.513			
	st.dev. (n)	0.4456			
	R(calc.)	1.248			
	st.dev.(D4739:17)	1.4098			
	R(D4739:17)	3.948			

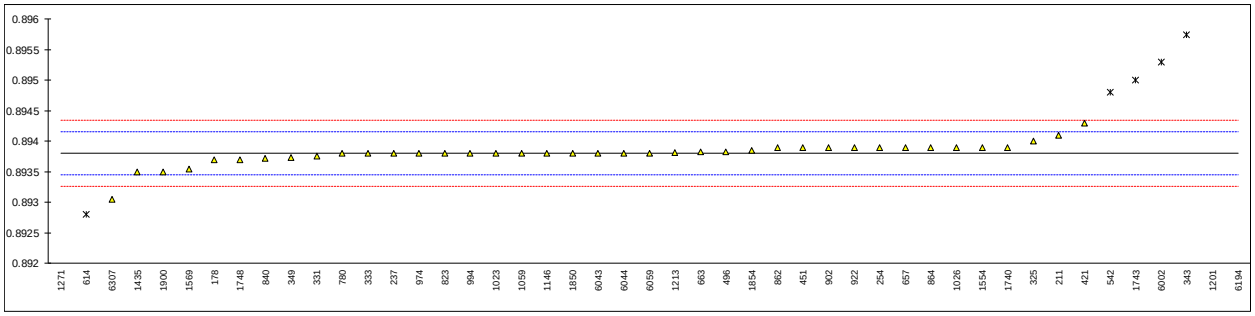


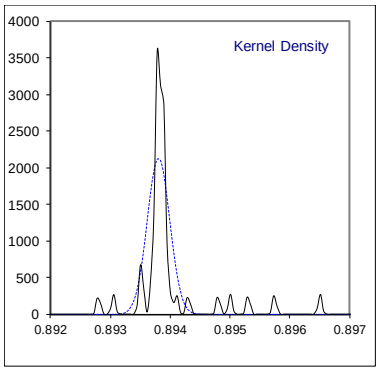


Determination of Density at 15°C on sample #20076; results in kg/L

lab	method	value	mark	z(targ)	remarks
178	D4052	0.8937		-0.57	
179		-----		-----	
211	D4052	0.8941		1.67	
225		-----		-----	
230		-----		-----	
237	D4052	0.8938		-0.01	
254	D4052	0.8939		0.55	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D4052	0.8940		1.11	
331	ISO12185	0.89375		-0.29	
333	D4052	0.8938		-0.01	
343	D4052	0.89574	C,R(0.01)	10.85	first reported 895,8 kg/m^3
349	D4052	0.89373		-0.41	
421	ISO12185	0.8943		2.79	
451	D4052	0.8939	C	0.55	first reported 894.9 kg/L
496	ISO12185	0.89383		0.15	
511		-----		-----	
512		-----		-----	
542	D4052	0.8948	R(0.01)	5.59	
562		-----		-----	
575		-----		-----	
614	D4052	0.8928	R(0.01)	-5.61	
633		-----		-----	
634		-----		-----	
657	D4052	0.8939		0.55	
663	D4052	0.89382		0.10	
780	ISO12185	0.8938		-0.01	
823	ISO12185	0.8938		-0.01	
840	D4052	0.89372		-0.46	
862	D4052	0.8939		0.55	
863		-----		-----	
864	ISO12185	0.8939		0.55	
875		-----		-----	
902	D4052	0.89390		0.55	
912		-----		-----	
913		-----		-----	
922	D4052	0.8939		0.55	
962		-----		-----	
963		-----		-----	
974	D4052	0.8938		-0.01	
994	ISO12185	0.8938		-0.01	
1023	D4052	0.8938		-0.01	
1026	D4052	0.8939		0.55	
1059	ISO12185	0.8938		-0.01	
1146	D4052	0.8938		-0.01	
1173		-----		-----	
1201	D4052	0.8965	R(0.01)	15.11	
1213	D4052	0.89381		0.04	
1271	D4052	0.8892	C,R(0.01)	-25.77	first reported 895,0 kg/m^3
1316		-----		-----	
1318		-----		-----	
1435	D4052	0.8935		-1.69	
1554	ISO12185	0.89390		0.55	
1569	D4052	0.89354	C	-1.47	first reported 894.6 kg/m^3
1648		-----	W	-----	test result withdrawn, first reported 895.06 kg/m^3
1740	D4052	0.8939	C	0.55	first reported 0.8932
1743	In house	0.8950	C,R(0.01)	6.71	first reported 893.0 kg/m^3
1748	D4052	0.8937		-0.57	
1807		-----		-----	
1850	D4052	0.8938		-0.01	
1854	D4052	0.89385		0.27	
1876		-----		-----	
1900	D4052	0.8935		-1.69	
1969		-----		-----	
2133		-----		-----	
6002	ISO3675	0.8953	C,R(0.01)	8.39	first reported 894.6 kg/m^3
6016		-----		-----	
6043	D4052	0.8938		-0.01	
6044	D4052	0.8938		-0.01	
6059	D4052	0.8938		-0.01	
6080		-----		-----	
6115		-----		-----	
6194	D1217	0.9032	R(0.01)	52.63	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307	IP365	0.89305		-4.21	
	normality	not OK			
	n	39			
	outliers	8			
	mean (n)	0.89380			
	st.dev. (n)	0.000187			
	R(calc.)	0.00052			
	st.dev.(ISO12185:96)	0.000179			
	R(ISO12185:96)	0.0005			

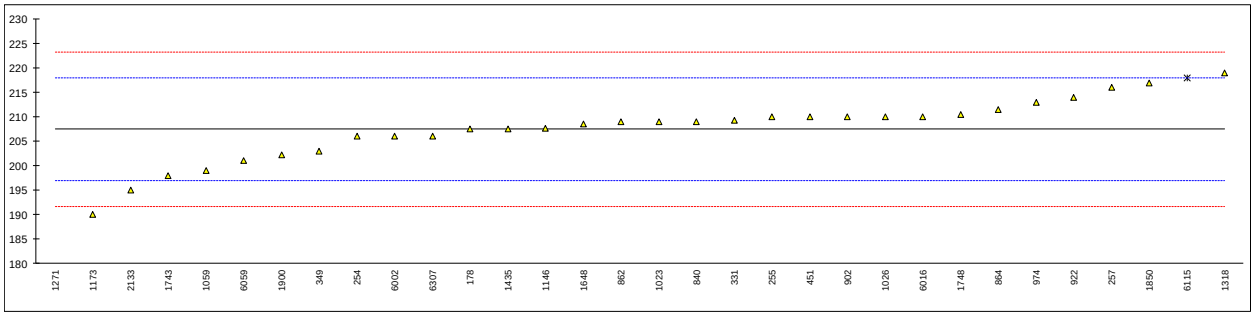


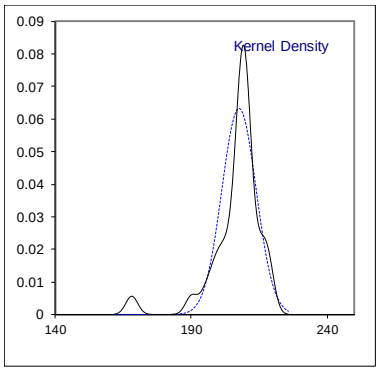


Determination of Flash Point PMcc (procedure A) on sample #20076; results in °C

lab	method	value	mark	z(targ)	remarks
178	D93-A	207.5		0.00	
179		-----		-----	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254	D93-A	206		-0.28	
255	D93-A	210		0.48	
257	D93-A	216.0		1.62	
311		-----		-----	
325		-----		-----	
331	D93-A	209.3		0.34	
333		-----		-----	
343		-----		-----	
349	D93-A	203		-0.85	
421		-----		-----	
451	D93-A	210.0		0.48	
496		-----		-----	
511		-----		-----	
512		-----		-----	
542	D7094	>180		-----	
562		-----		-----	
575		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840	D3828	209.0		0.29	
862	D93-A	209		0.29	
863		-----		-----	
864	D93-A	211.5		0.76	
875		-----		-----	
902	D93-A	210		0.48	
912		-----		-----	
913		-----		-----	
922	D93-A	214		1.24	
962		-----		-----	
963		-----		-----	
974	D93-A	213		1.05	
994		-----		-----	
1023	D93-A	209		0.29	
1026	D93-A	210.0		0.48	
1059	ISO2719-A	199.0		-1.61	
1146	D93-A	207.6		0.02	
1173	D93-A	190.0		-3.32	
1201		-----		-----	
1213		-----		-----	
1271	ISO2719-A	168	C,R(0.01)	-7.51	first reported 182
1316		-----		-----	
1318	D6450	219		2.19	
1435	D93-A	207.5		0.00	
1554		-----		-----	
1569	D93-A	>250		>8.08	possibly a false positive test result?
1648	D93-A	208.5		0.19	
1740		-----		-----	
1743	ISO2719-A	198.0		-1.80	
1748	D93-A	210.5		0.57	
1807		-----		-----	
1850	ISO2719-A	217		1.81	
1854		-----		-----	
1876		-----		-----	
1900	D7094	202.2		-1.00	
1969		-----		-----	
2133	D93-A	195.0		-2.37	
6002	ISO2719-A	206.0		-0.28	
6016	D93-A	210		0.48	
6043		-----		-----	
6044		-----		-----	
6059	D93-A	201	C	-1.23	first reported 164
6080		-----		-----	
6115	D92	218	ex	2.00	test result excluded as method is an open cup method
6194		-----		-----	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307	IP523	206.025		-0.28	
	normality	suspect			
	n	30			
	outliers	1 +1ex			
	mean (n)	207.488			
	st.dev. (n)	6.3157			
	R(calc.)	17.684			
	st.dev.(D93-A:20)	5.2613			
	R(D93-A:20)	14.732			



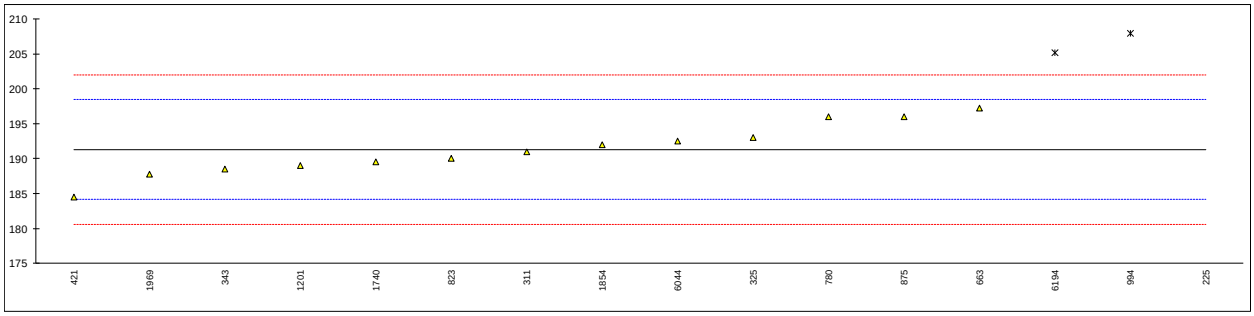


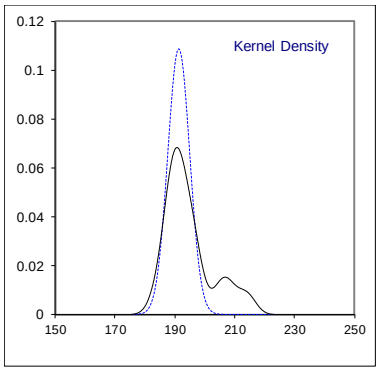
Determination of Flash Point PMcc (procedure B) on sample #20076; results in °C

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
225	D93-B	214.0	DG(0.05)	6.35	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311	D93-B	191.0		-0.09	
325	D93-B	193		0.47	
331		-----		-----	
333		-----		-----	
343	D93-B	188.5		-0.79	
349		-----		-----	
421	ISO2719-B	184.5		-1.91	
451		-----		-----	
496		-----		-----	
511		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
575		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D93-B	197.3		1.68	
780	D93-B	196.0		1.31	
823	D93-B	190		-0.37	
840		-----		-----	
862		-----		-----	
863		-----		-----	
864		-----		-----	
875	D93-B	196		1.31	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D93-B	208.0	DG(0.05)	4.67	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201	D93-B	189.0		-0.65	
1213		-----		-----	
1271		-----		-----	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1554		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D93-B	189.5		-0.51	
1743		-----		-----	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854	D93-B	192		0.19	
1876		-----		-----	
1900		-----		-----	
1969	ISO2719-B	187.825		-0.98	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044	D93-B	192.5		0.33	
6059		-----		-----	
6080		-----		-----	
6115		-----		-----	
6194	D93-B	205.175	G(0.05)	3.88	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	

normality	OK
n	13
outliers	3
mean (n)	191.317
st.dev. (n)	3.6681
R(calc.)	10.271
st.dev.(D93-A:20)	3.5714
R(D93-A:20)	10

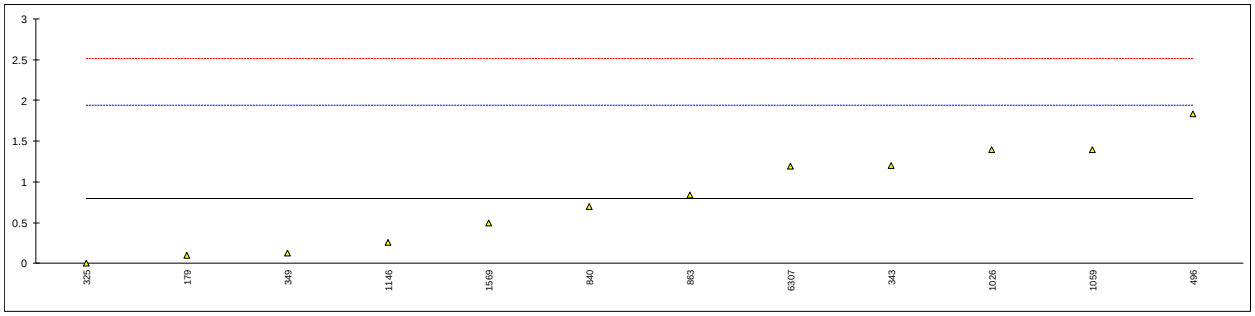


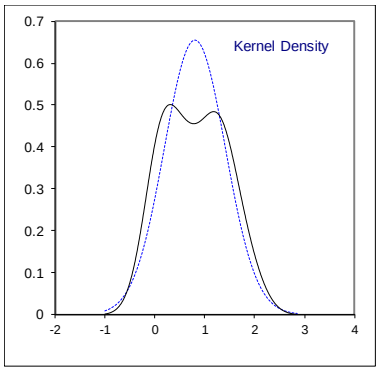


Determination of Fuel Dilution on sample #20076; results in %M/M

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D3524	0.1		-1.22	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	In house	0.00		-1.40	
331	D3524Mod.	<0.4		-----	
333		-----		-----	
343	D3524	1.2		0.70	
349	D3524	0.13		-1.17	
421		-----		-----	
451		-----		-----	
496	DIN51454	1.84		1.82	
511		-----		-----	
512		-----		-----	
542		-----		-----	
562		-----		-----	
575		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840	D3524	0.70		-0.17	
862	D3524	<0.1		-----	
863	D3524	0.84		0.07	
864		-----		-----	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026	D7593	1.4		1.05	
1059	D3524	1.4	C	1.05	first reported 3,5
1146	In house	0.26		-0.94	
1173		-----		-----	
1201		-----		-----	
1213		-----		-----	
1271		-----		-----	
1316	D3524	<0,4		-----	
1318		-----		-----	
1435		-----		-----	
1554		-----		-----	
1569	D3524	0.5		-0.52	
1648		-----		-----	
1740		-----		-----	
1743		-----		-----	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1876		-----		-----	
1900		-----		-----	
1969		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6080		-----		-----	
6115		-----		-----	
6194		-----		-----	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307	D7593	1.197		0.70	
	normality	OK			
	n	12			
	outliers	0			
	mean (n)	0.797			
	st.dev. (n)	0.6099			
	R(calc.)	1.708			
	st.dev.(D3524:14)	0.5714			
	R(D3524:14)	1.6			

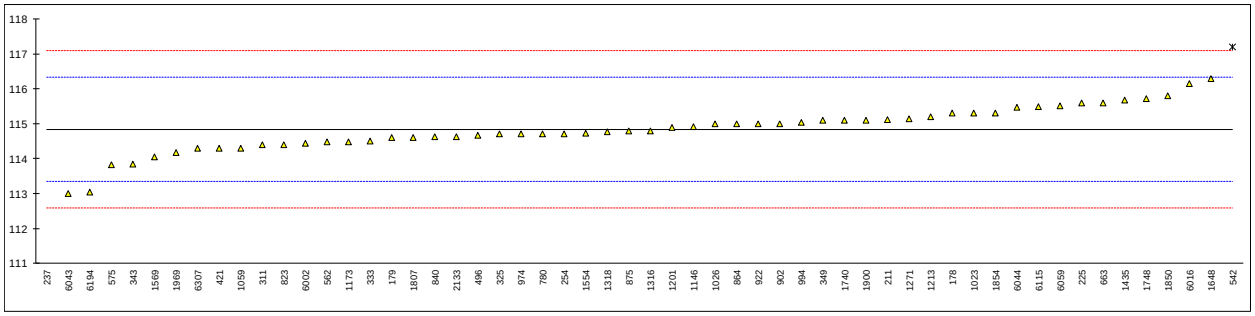


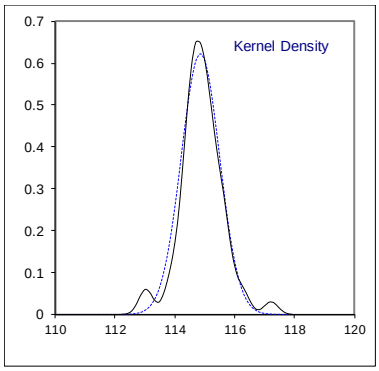


Determination of Kinematic Viscosity at 40°C on sample #20076; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	115.3		0.61	
179	D445	114.60		-0.32	
211	D445	115.13		0.39	
225	D445	115.6		1.01	
230		-----		-----	
237	D445	79.49	R(0.01)	-47.24	
254	D445	114.7		-0.19	
255		-----		-----	
257		-----		-----	
311	D445	114.4		-0.59	
325	D445	114.7		-0.19	
331		-----		-----	
333	D445	114.5		-0.46	
343	D445	113.84	C	-1.34	first reported 114,9
349	D445	115.1		0.35	
421	ISO3104	114.3		-0.72	
451		-----		-----	
496	D445	114.66		-0.24	
511		-----		-----	
512		-----		-----	
542	D7042	117.2	R(0.05)	3.15	
562	D7279 corrected to D445	114.485		-0.48	
575	D445	113.83		-1.35	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D445	115.60		1.01	
780	D445	114.7		-0.19	
823	D445	114.4		-0.59	
840	D7042	114.63		-0.28	
862		-----		-----	
863		-----		-----	
864	D445	115.0		0.21	
875	D445	114.8		-0.06	
902	D445	115.0		0.21	
912		-----		-----	
913		-----		-----	
922	D445	115.0		0.21	
962		-----		-----	
963		-----		-----	
974	D445	114.7		-0.19	
994	D7042	115.03		0.25	
1023	D445	115.3		0.61	
1026	D445	115.0	C	0.21	first reported as KV 100°C
1059	ISO3104	114.3		-0.72	
1146	D445	114.91		0.09	
1173	IP71	114.49		-0.47	
1201	D445	114.9		0.08	
1213	D445	115.2		0.48	
1271	ISO3104	115.147		0.41	
1316	ISO3104	114.8		-0.06	
1318	D7042	114.78		-0.08	
1435	D7042	115.67		1.11	
1554	ISO3104	114.7252		-0.16	
1569	D445	114.06		-1.04	
1648	D445	116.30		1.95	
1740	D445	115.1		0.35	
1743		-----		-----	
1748	D7042	115.71		1.16	
1807	D445	114.6		-0.32	
1850	ISO3104	115.8		1.28	
1854	ISO3104	115.3		0.61	
1876		-----		-----	
1900	D445	115.1		0.35	
1969	ISO3104	114.1779		-0.89	
2133	D445	114.63		-0.28	
6002	ISO3104	114.45		-0.52	
6016	D7042	116.150		1.75	
6043	D445	113		-2.46	
6044	D7042	115.48		0.85	
6059	D445	115.52		0.91	
6080		-----		-----	
6115	D445	115.5		0.88	
6194	D445	113.0406		-2.41	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307	IP71	114.29		-0.74	
	normality	suspect			
	n	54			
	outliers	2			
	mean (n)	114.841			
	st.dev. (n)	0.6411			
	R(calc.)	1.795			
	st.dev.(D445:19a)	0.7484			
	R(D445:19a)	2.095			

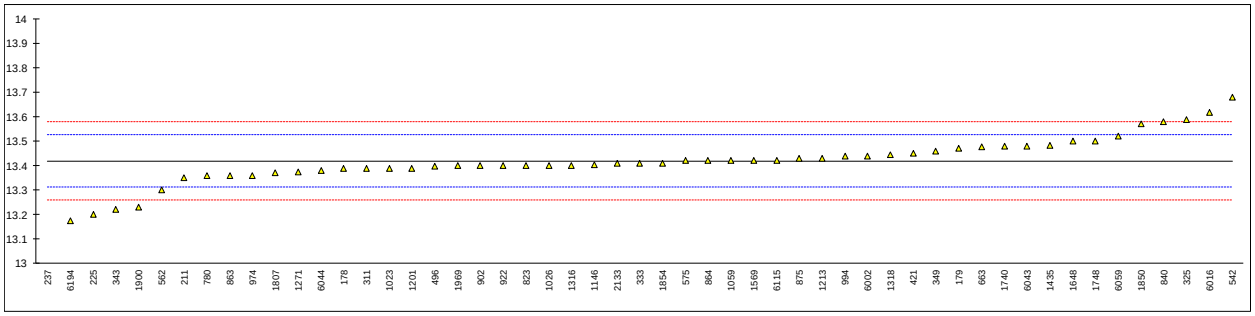


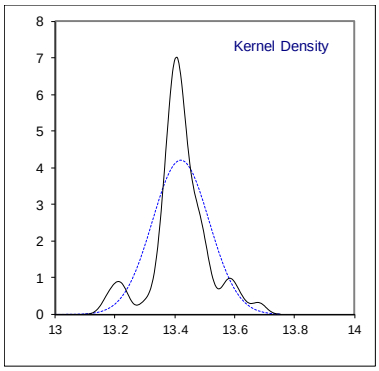


Determination of Kinematic Viscosity at 100°C on sample #20076; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178	D445	13.39		-0.55	
179	D445	13.47		0.94	
211	D445	13.35		-1.30	
225	D445	13.20		-4.09	
230		-----		-----	
237	D445	11.87	R(0.01)	-28.89	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311	D445	13.39		-0.55	
325	D445	13.59		3.18	
331		-----		-----	
333	D445	13.41		-0.18	
343	D445	13.22		-3.72	
349	D445	13.46		0.75	
421	ISO3104	13.45	C	0.57	first reported 12,84
451		-----		-----	
496	D445	13.398		-0.40	
511		-----		-----	
512		-----		-----	
542	D7042	13.68		4.85	
562	D7279 corrected to D445	13.302		-2.19	
575	D445	13.42		0.01	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D445	13.478		1.09	
780	D445	13.36		-1.11	
823	D445	13.40		-0.36	
840	D7042	13.579		2.97	
862		-----		-----	
863	D445	13.36		-1.11	
864	D445	13.42		0.01	
875	D445	13.43		0.19	
902	D445	13.40		-0.36	
912		-----		-----	
913		-----		-----	
922	D445	13.40	C	-0.36	first reported 13.59
962		-----		-----	
963		-----		-----	
974	D445	13.36		-1.11	
994	D7042	13.44		0.38	
1023	D445	13.39		-0.55	
1026	D445	13.40	C	-0.36	first reported as KV 40°C
1059	ISO3104	13.42		0.01	
1146	D445	13.404		-0.29	
1173		-----		-----	
1201	D445	13.39		-0.55	
1213	D445	13.43		0.19	
1271	ISO3104	13.374		-0.85	
1316	ISO3104	13.40		-0.36	
1318	D7042	13.445		0.47	
1435	D7042	13.484		1.20	
1554		-----		-----	
1569	D445	13.42		0.01	
1648	D445	13.50		1.50	
1740	D445	13.48		1.13	
1743		-----		-----	
1748	D7042	13.501		1.52	
1807	D445	13.37		-0.92	
1850	ISO3104	13.57		2.80	
1854	ISO3104	13.41		-0.18	
1876		-----		-----	
1900	D445	13.23		-3.53	
1969	ISO3104	13.3999		-0.37	
2133	D445	13.409		-0.20	
6002	ISO3104	13.44		0.38	
6016	D7042	13.619		3.72	
6043	D445	13.48		1.13	
6044	D7042	13.38		-0.74	
6059	D445	13.52		1.87	
6080		-----		-----	
6115	D445	13.42		0.01	
6194	D445	13.1745	C	-4.57	first reported 14.1869
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	
	normality	suspect			
	n	52			
	outliers	1			
	mean (n)	13.420			
	st.dev. (n)	0.0945			
	R(calc.)	0.265			
	st.dev.(D445:19a)	0.0536			
	R(D445:19a)	0.150			



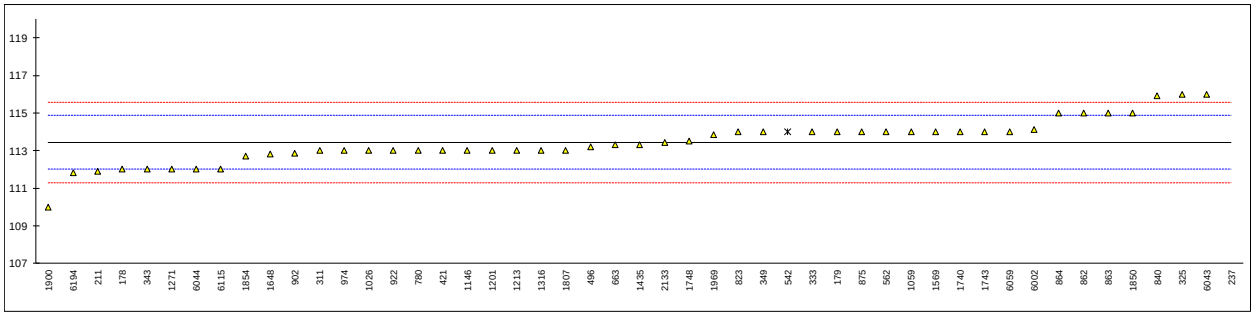


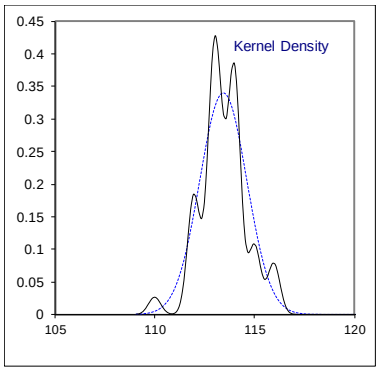
Determination of Viscosity Index on sample #20076

lab	method	value	mark	z(targ)	remarks
178	D2270	112		-2.02	
179	D2270	114		0.78	
211	D2270	111.9		-2.16	
225		-----		-----	
230		-----		-----	
237	D2270	143	ex	41.38	excluded as outlier in Kinematic Viscosity 40° and 100°C
254		-----		-----	
255		-----		-----	
257		-----		-----	
311	ISO2909	113		-0.62	
325	D2270	116		3.58	
331		-----		-----	
333	D2270	114		0.78	
343	D2270	112	C	-2.02	first reported 110
349	D2270	114		0.78	
421	ISO2909	113	E	-0.62	calculation error, iis calculated 114
451		-----		-----	
496	D2270	113.2		-0.34	
511		-----		-----	
512		-----		-----	
542	D2270	114	ex	0.78	excluded as outlier in Kinematic Viscosity 40°
562	D2270	114	E	0.78	calculation error, iis calculated 112
575		-----		-----	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657		-----		-----	
663	D2270	113.31		-0.18	
780	D2270	113		-0.62	
823	D2270	114		0.78	
840	D2270	115.9		3.44	
862	D2270	115		2.18	
863	D2270	115		2.18	
864	D2270	115	E	2.18	calculation error, iis calculated 113
875	D2270	114		0.78	
902	D2270	112.87		-0.80	
912		-----		-----	
913		-----		-----	
922	D2270	113	C	-0.62	first reported 116
962		-----		-----	
963		-----		-----	
974	D2270	113		-0.62	
994		-----		-----	
1023		-----		-----	
1026	D2270	113		-0.62	
1059	ISO2909	114		0.78	
1146	D2270	113		-0.62	
1173		-----		-----	
1201	D2270	113		-0.62	
1213	D2270	113		-0.62	
1271	ISO2909	112		-2.02	
1316	D2270	113		-0.62	
1318		-----		-----	
1435	D2270	113.31		-0.18	
1554		-----		-----	
1569	D2270	114		0.78	
1648	D2270	112.8		-0.90	
1740	D2270	114		0.78	
1743	ISO2909	114		0.78	
1748	D2270	113.5		0.08	
1807	D2270	113		-0.62	
1850	ISO2909	115	E	2.18	calculation error, iis calculated 114
1854	D2270	112.7		-1.04	
1876		-----		-----	
1900	D2270	110		-4.82	
1969	ISO2909	113.85		0.57	
2133	D2270	113.44		0.00	
6002	ISO2909	114.11		0.94	
6016		-----		-----	
6043	D2270	116		3.58	
6044	D2270	112		-2.02	
6059	D2270	114		0.78	
6080		-----		-----	
6115	D2270	112	E	-2.02	calculation error, iis calculated 113
6194	D2270	111.8411	C	-2.24	first reported 126.4650
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	

normality	OK
n	47
outliers	0 +2ex
mean (n)	113.44
st.dev. (n)	1.176
R(calc.)	3.29
st.dev.(D2270:10)	0.714
R(D2270:10)	2



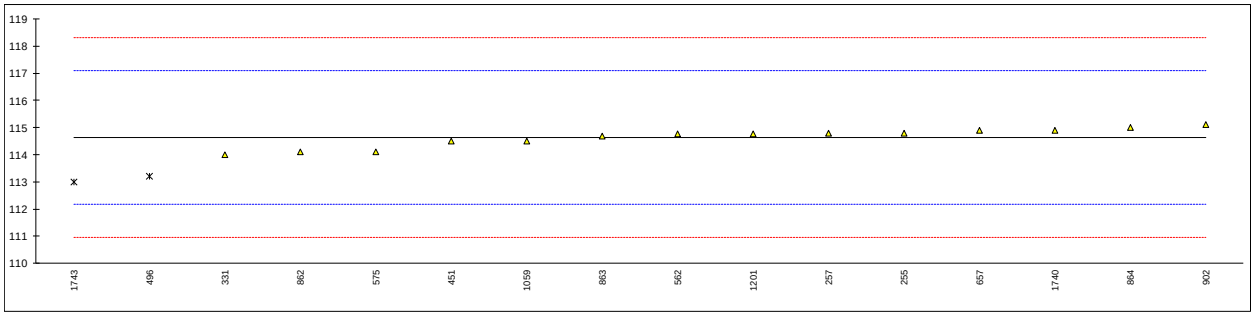


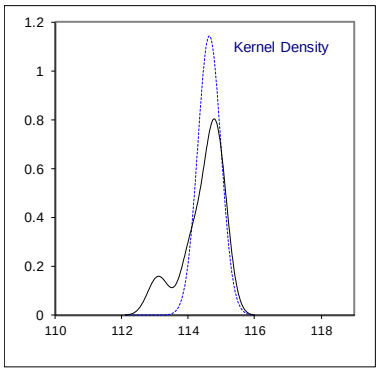
Determination of Kinematic Viscosity Houillon at 40°C on sample #20076; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255	D7279	114.8		0.13	
257	D7279	114.8		0.13	
311		-----		-----	
325		-----		-----	
331	D7279Mod.	114.0		-0.52	
333		-----		-----	
343		-----		-----	
349		-----		-----	
421		-----		-----	
451	D7279	114.5		-0.11	
496	D7279	113.2	DG(0.01)	-1.17	
511		-----		-----	
512		-----		-----	
542		-----		-----	
562	D7279	114.775		0.11	
575	D7279	114.11		-0.43	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D7279	114.9		0.21	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D7279	114.1		-0.44	
863	D7279	114.7		0.05	
864	D7279	115.0		0.29	
875		-----		-----	
902	D7279	115.1		0.37	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	114.5		-0.11	
1146		-----		-----	
1173		-----		-----	
1201	D7279	114.78		0.11	
1213		-----		-----	
1271		-----		-----	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1554		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D7279	114.9		0.21	
1743	D7279	113.0	DG(0.01)	-1.34	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1876		-----		-----	
1900		-----		-----	
1969		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6080		-----		-----	
6115		-----		-----	
6194		-----		-----	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	

normality	OK
n	14
outliers	2
mean (n)	114.640
st.dev. (n)	0.3498
R(calc.)	0.979
st.dev.(D7279:18)	1.2283
R(D7279:18)	3.439



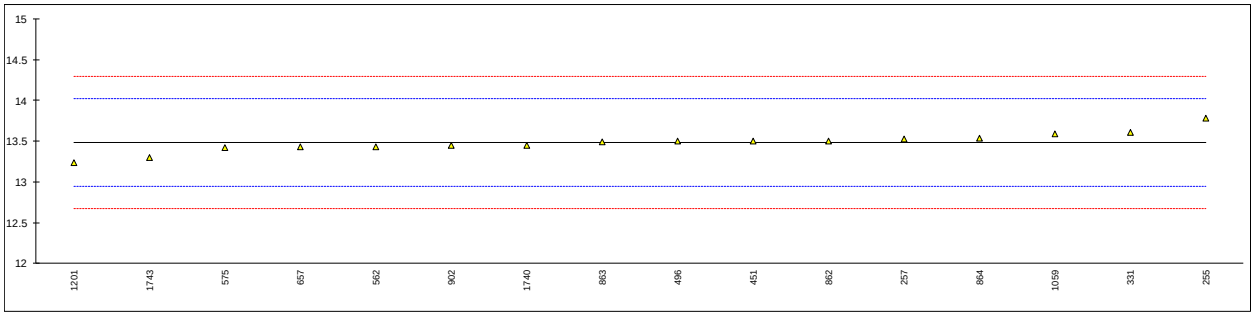


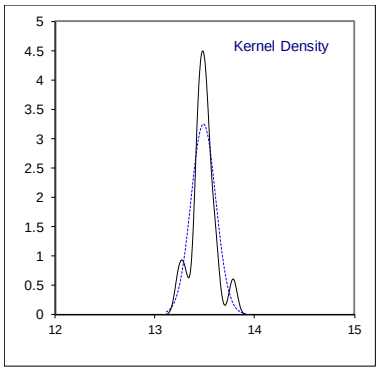
Determination of Kinematic Viscosity Houillon at 100°C on sample #20076; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255	D7279	13.78		1.09	
257	D7279	13.53		0.17	
311		-----		-----	
325		-----		-----	
331	D7279Mod.	13.61		0.46	
333		-----		-----	
343		-----		-----	
349		-----		-----	
421		-----		-----	
451	D7279	13.50		0.05	
496	D7279	13.50		0.05	
511		-----		-----	
512		-----		-----	
542		-----		-----	
562	D7279	13.435		-0.19	
575	D7279	13.42		-0.24	
614		-----		-----	
633		-----		-----	
634		-----		-----	
657	D7279	13.43		-0.21	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D7279	13.50		0.05	
863	D7279	13.49		0.02	
864	D7279	13.54		0.20	
875		-----		-----	
902	D7279	13.45		-0.13	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059	D7279	13.59		0.39	
1146		-----		-----	
1173		-----		-----	
1201	D7279	13.24		-0.91	
1213		-----		-----	
1271		-----		-----	
1316		-----		-----	
1318		-----		-----	
1435		-----		-----	
1554		-----		-----	
1569		-----		-----	
1648		-----		-----	
1740	D7279	13.45		-0.13	
1743	D7279	13.3		-0.69	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1876		-----		-----	
1900		-----		-----	
1969		-----		-----	
2133		-----		-----	
6002		-----		-----	
6016		-----		-----	
6043		-----		-----	
6044		-----		-----	
6059		-----		-----	
6080		-----		-----	
6115		-----		-----	
6194		-----		-----	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307		-----		-----	

normality	suspect
n	16
outliers	0
mean (n)	13.4853
st.dev. (n)	0.12271
R(calc.)	0.3436
st.dev.(D7279:18)	0.26971
R(D7279:18)	0.7552

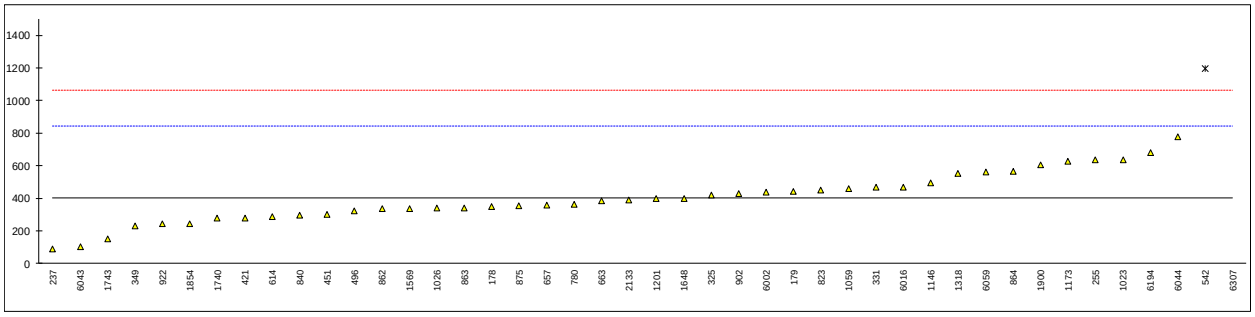


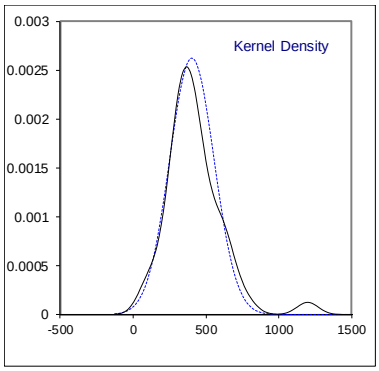


Determination of Water on sample #20076; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D6304-C	349		-0.24	
179	D6304-C	442		0.18	
211		-----		-----	
225		-----		-----	
230		-----		-----	
237	D6304-C	89.9		-1.42	
254		-----		-----	
255	D6304-A	634		1.05	
257		-----		-----	
311		-----		-----	
325	D6304-C	418		0.07	
331	D6304Mod.	470		0.31	
333		-----		-----	
343		-----		-----	
349	D6304-A	232		-0.77	
421	D6304-C	278.6		-0.56	
451	D6304-C	300		-0.46	
496	D6304-C	322		-0.36	
511		-----		-----	
512		-----		-----	
542		1198	R(0.01)	3.61	
562		-----		-----	
575		-----		-----	
614	D6304-C	289		-0.51	
633		-----		-----	
634		-----		-----	
657	D6304-C	357		-0.20	
663	D6304-C	383.3		-0.08	
780	D6304-C	363.6		-0.17	
823	D6304-C	450		0.22	
840	D6304-C	297		-0.48	
862	D6304-C	334.8		-0.31	
863	D6304-C	341		-0.28	
864	D6304-C	566		0.74	
875	D6304-A	353		-0.22	
902	D6304-C	430		0.13	
912		-----		-----	
913		-----		-----	
922	D6304-A	242		-0.73	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023	D6304-A	638.0		1.07	
1026	D6304-C	339		-0.29	
1059	D6304-C	460		0.26	
1146	D6304-C	494		0.42	
1173	In house	629.0		1.03	
1201	D6304-A	400		-0.01	
1213		-----		-----	
1271		-----		-----	
1316		-----		-----	
1318	D6304-C	551.2		0.68	
1435		-----		-----	
1554		-----		-----	
1569	D6304-C	338		-0.29	
1648	D6304-C	400		-0.01	
1740	D6304-C	278.5		-0.56	
1743	NFT 60-640	150		-1.14	
1748		-----		-----	
1807		-----		-----	
1850		-----		-----	
1854	D6304-C	242		-0.73	
1876		-----		-----	
1900	D6304-C	607		0.93	
1969		-----		-----	
2133	D6304-A	390		-0.05	
6002	In house	435.74		0.15	
6016		470		0.31	
6043	D4928	101		-1.37	
6044	D6304-C	776		1.70	
6059	D6304-A	560		0.72	
6080		-----		-----	
6115		-----		-----	
6194	D6304-A	682.3575		1.27	
6301		-----		-----	

lab	method	value	mark	z(targ)	remarks
6307	IP74	7100	R(0.01)	30.40	
	normality	OK			
	n	42			
	outliers	2			
	mean (n)	402.00			
	st.dev. (n)	152.302			
	R(calc.)	426.45			
	st.dev.(D6304:16e1)	220.318			
	R(D6304:16e1)	616.89			



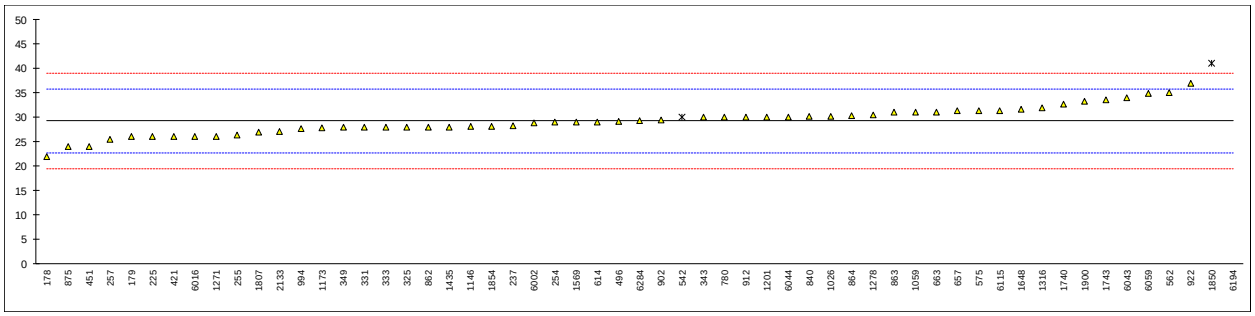


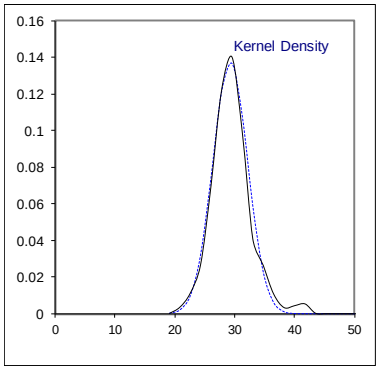
Determination of Aluminum as Al on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	22		-2.22	
179	D5185	26		-1.00	
225	D6595	26		-1.00	
230		-----		-----	
237	D5185	28.30		-0.29	
254	D5185	28.95	C	-0.09	first reported 18.32
255		26.4		-0.88	
257		25.4		-1.18	
311		-----		-----	
325	D5185	28		-0.39	
331	D5185Mod.	28		-0.39	
333	D5185	28		-0.39	
343	D5185	30		0.23	
349	D5185	28		-0.39	
421	D5185	26.0		-1.00	
451	D5185	24		-1.61	
496	D5185	29.15		-0.03	
511		-----		-----	
512		-----		-----	
542	D6595	30	ex	0.23	test result excluded, see §4.1
562	D6595	35		1.76	
575	D6595	31.36		0.64	
614	D5185	29.03		-0.07	
633		-----		-----	
634		-----		-----	
657	D5185	31.3		0.63	
663	D5185	31.06		0.55	
780	D5185	30		0.23	
823		-----		-----	
840	D5185	30.2		0.29	
862	D5185	28		-0.39	
863	D5185	31		0.53	
864	D5185	30.3		0.32	
875	D5185	24		-1.61	
902	D5185	29.5		0.07	
912	D5185	30.0		0.23	
913		-----		-----	
922	D5185	37		2.37	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.6		-0.51	
1023		-----		-----	
1026	D5185	30.2		0.29	
1059	In house	31		0.53	
1146	D5185	28.04		-0.37	
1173	In house	27.845		-0.43	
1201	D5185	30		0.23	
1271	D5185	26.1		-0.97	
1278	D5185	30.4		0.35	
1316	D5185	31.9		0.81	
1435	D5185	28		-0.39	
1569	D5185	29		-0.08	
1648	D5185	31.7		0.75	
1740	D5185	32.6		1.02	
1743	D5185	33.54		1.31	
1807	D5185	27		-0.69	
1850	In house	41	R(0.01)	3.60	
1854	D5185	28.1		-0.35	
1900	D5185	33.32		1.24	
2133	D5185	27.081		-0.67	
6002	D5185	28.9		-0.11	
6016	D5185	26		-1.00	
6043		34		1.45	
6044	D5185	30		0.23	
6059	D5185	34.9		1.73	
6115	D6595	31.40		0.66	
6194	D5185	460.9391	C,R(0.01)	132.23	first reported 13.7479
6284	D5185	29.312		0.02	
6301		-----		-----	

normality	OK
n	54
outliers	2 +1ex
mean (n)	29.257
st.dev. (n)	2.9050
R(calc.)	8.134
st.dev.(D5185:18)	3.2647
R(D5185:18)	9.141

application range: 6 – 40 mg/kg





Determination of Barium as Ba on sample #20077; results in mg/kg

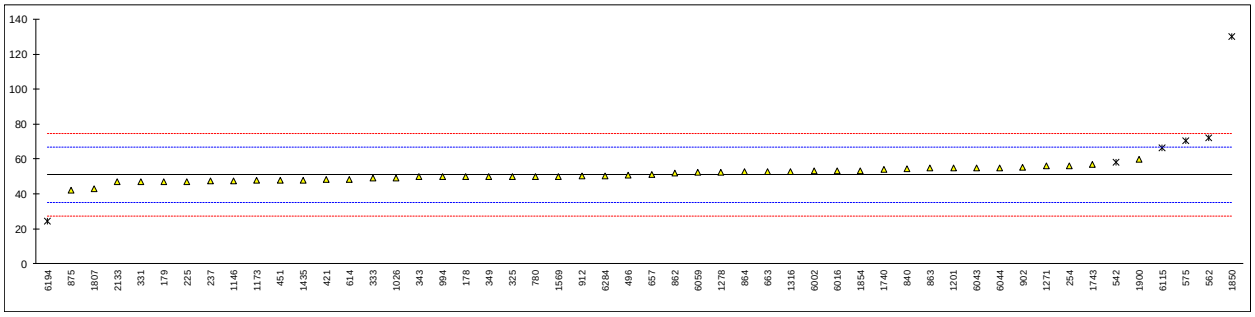
lab	method	value	mark	z(targ)	remarks
178	D5185	50.0		-0.13	
179	D5185	47.0		-0.51	
225	D6595	47		-0.51	
230		-----		-----	
237	D5185	47.40		-0.46	
254	D5185	56.15		0.66	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	50		-0.13	
331	D5185Mod.	47		-0.51	
333	D5185	49		-0.25	
343	D5185	49.8		-0.15	
349	D5185	50		-0.13	
421	D5185	48.2		-0.35	
451	D5185	48		-0.38	
496	D5185	50.57		-0.05	
511		-----		-----	
512		-----		-----	
542	D6595	58	ex	0.89	test result excluded, see §4.1
562	D6595	72	C,R(0.01)	2.68	first reported 79
575	D6595	70.52	C,R(0.01)	2.49	first reported 76.52
614	D5185	48.23		-0.35	
633		-----		-----	
634		-----		-----	
657	D5185	51.1		0.02	
663	D5185	52.66		0.21	
780	D5185	50		-0.13	
823		-----		-----	
840	D5185	54.5		0.45	
862	D5185	52		0.13	
863	D5185	55		0.51	
864	D5185	52.6		0.21	
875	D5185	42		-1.15	
902	D5185	55.4		0.56	
912	D5185	50.2		-0.10	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	49.8		-0.15	
1023		-----		-----	
1026	D5185	49		-0.25	
1059		-----		-----	
1146	D5185	47.64		-0.43	
1173	In house	47.85		-0.40	
1201	D5185	55		0.51	
1271	D5185	56.1		0.65	
1278	D5185	52.40		0.18	
1316	D5185	52.9		0.24	
1435	D5185	48		-0.38	
1569	D5185	50		-0.13	
1648		-----		-----	
1740	D5185	54.1		0.40	
1743	D5185	56.87		0.75	
1807	D5185	43		-1.02	
1850	In house	130	R(0.01)	10.07	
1854	D5185	53.3		0.30	
1900	D5185	59.766		1.12	
2133	D5185	46.887		-0.52	
6002	D5185	53.0		0.26	
6016	D5185	53		0.26	
6043		55		0.51	
6044	D5185	55		0.51	
6059	D5185	52.3		0.17	
6115	D6595	66.53	R(0.01)	1.98	
6194	D5185	24.4021	C,R(0.01)	-3.39	first reported 25.3423
6284	D5185	50.406		-0.07	
6301		-----		-----	

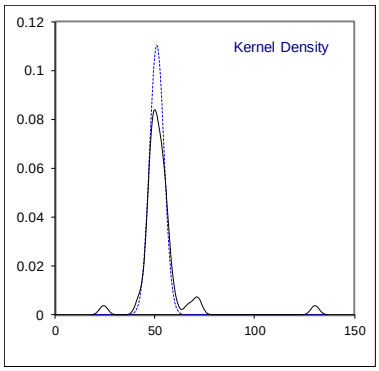
normality	OK
n	46
outliers	5 +1ex
mean (n)	50.981
st.dev. (n)	3.6227
R(calc.)	10.143
st.dev.(D5185:18)	7.8435
R(D5185:18)	21.962

application range: 0.5 – 4 mg/kg

Compare:

R(Horwitz)	12.639





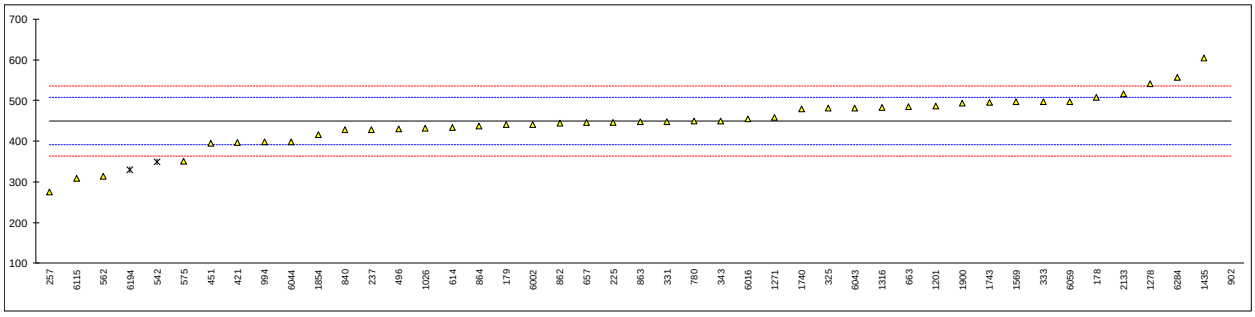
Determination of Boron as B on sample #20077; results in mg/kg

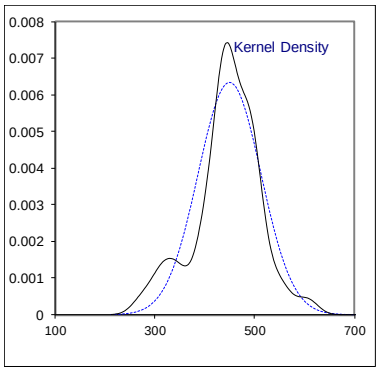
lab	method	value	mark	z(targ)	remarks
178	D5185	508		2.03	
179	D5185	440		-0.34	
225	D6595	447		-0.09	
230		-----		-----	
237	D5185	429.1		-0.72	
254		-----		-----	
255		-----		-----	
257		275.0		-6.09	
311		-----		-----	
325	D5185	481		1.09	
331	D5185Mod.	448		-0.06	
333	D5185	498		1.69	
343	D5185	450		0.01	
349		-----		-----	
421	D5185	397		-1.83	
451	D5185	395		-1.90	
496	D5185	430.8		-0.66	
511		-----		-----	
512		-----		-----	
542	D6595	350	ex	-3.47	test result excluded, see §4.1
562	D6595	314		-4.73	
575	D6595	350.42		-3.46	
614	D5185	433.2		-0.57	
633		-----		-----	
634		-----		-----	
657	D5185	446		-0.13	
663	D5185	484.28		1.21	
780	D5185	449		-0.02	
823		-----		-----	
840	D5185	429		-0.72	
862	D5185	445		-0.16	
863	D5185	448		-0.06	
864	D5185	438		-0.41	
875		-----		-----	
902	D5185	1480	R(0.01)	35.92	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	399		-1.76	
1023		-----		-----	
1026	D5185	432		-0.61	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201	D5185	487		1.30	
1271	D5185	459.3		0.34	
1278	D5185	542		3.22	
1316	D5185	484		1.20	
1435	D5185	605		5.42	
1569	D5185	497		1.65	
1648		-----		-----	
1740	D5185	480		1.06	
1743	D5185	496.26		1.63	
1807		-----		-----	
1850		-----		-----	
1854	D5185	417		-1.14	
1900	D5185	493.79		1.54	
2133	D5185	517.279		2.36	
6002	D5185	440		-0.34	
6016	D5185	455		0.19	
6043		481		1.09	
6044	D5185	399		-1.76	
6059	D5185	498		1.69	
6115	D6595	308.3		-4.93	
6194	D5185	329.5247	ex,C	-4.19	test result excluded, see §4.1. First reported 276.9169
6284	D5185	557.78		3.77	
6301		-----		-----	

normality	suspect
n	42
outliers	1 +2ex
mean (n)	449.631
st.dev. (n)	63.0515
R(calc.)	176.544
st.dev.(Horwitz)	28.6868
R(Horwitz)	80.323

Compare:

R(D5185:18)	13.819	application range: 4 – 30 mg/kg

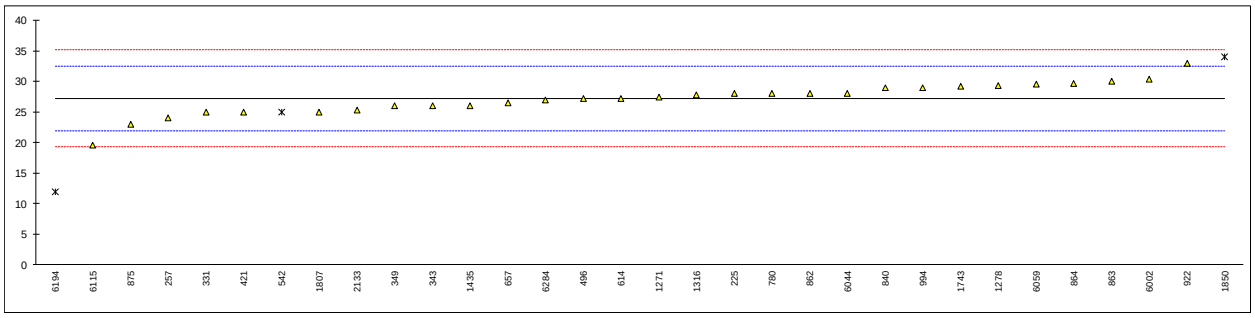


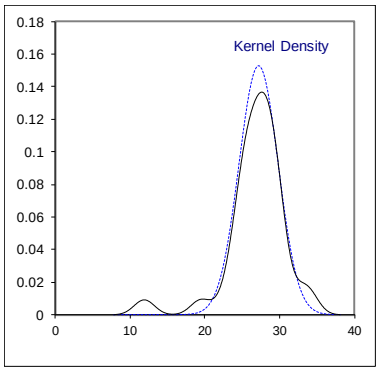


Determination of Cadmium as Cd on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179		-----		-----	
225	D6595	28		0.30	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		24.0		-1.21	
311		-----		-----	
325		-----		-----	
331	D5185Mod.	25		-0.83	
333		-----		-----	
343	D5185	26		-0.45	
349	D5185	26	C	-0.45	first reported 0
421	D5185	25.0		-0.83	
451		-----		-----	
496	D5185	27.14		-0.02	
511		-----		-----	
512		-----		-----	
542	D6595	25	ex	-0.83	test result excluded, see §4.1
562		-----		-----	
575		-----		-----	
614	D5185	27.24		0.01	
633		-----		-----	
634		-----		-----	
657	D5185	26.47		-0.28	
663		-----		-----	
780	D5185	28		0.30	
823		-----		-----	
840	D5185	29.0		0.68	
862	D5185	28		0.30	
863	D5185	30		1.06	
864	D5185	29.7		0.94	
875	D5185	23		-1.59	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922	D5185	33		2.19	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	29.0		0.68	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201		-----		-----	
1271	D5185	27.4	C	0.07	first reported 38,5
1278	D5185	29.3		0.79	
1316	D5185	27.8		0.23	
1435	D5185	26		-0.45	
1569		-----		-----	
1648		-----		-----	
1740		-----		-----	
1743	D5185	29.17		0.74	
1807	D5185	25		-0.83	
1850	In house	34	ex	2.57	test result excluded, see §4.1
1854		-----		-----	
1900		-----		-----	
2133	D5185	25.278		-0.73	
6002	D6595	30.4	C	1.21	first reported 10
6016		-----		-----	
6043		-----		-----	
6044	D5185	28		0.30	
6059	D5185	29.5		0.87	
6115	D6595	19.52		-2.90	
6194	D5185	11.9459	C,R(0.01)	-5.76	first reported 12.9459
6284	D5185	26.98		-0.08	
6301		-----		-----	

normality	suspect
n	29
outliers	1 +2ex
mean (n)	27.203
st.dev. (n)	2.6116
R(calc.)	7.312
st.dev.(Horwitz)	2.6473
R(Horwitz)	7.413



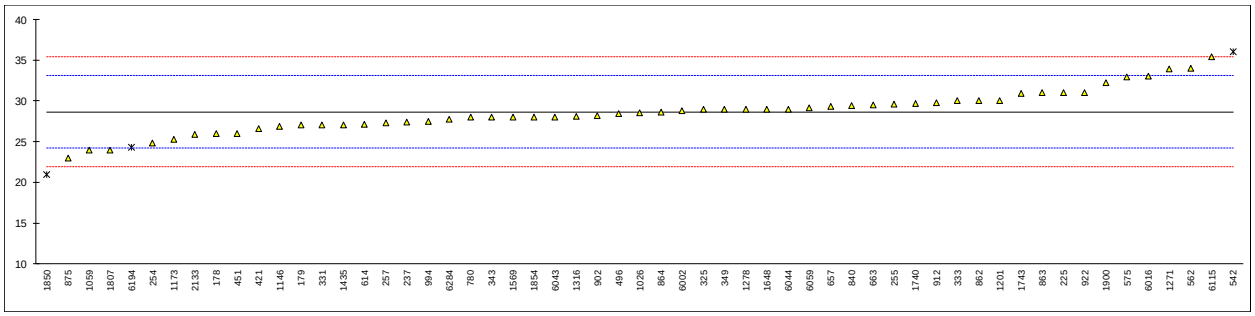


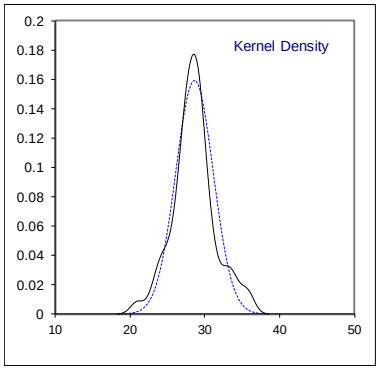
Determination of Chromium as Cr on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	26		-1.19	
179	D5185	27		-0.75	
225	D6595	31		1.04	
230		-----		-----	
237	D5185	27.38		-0.58	
254	D5185	24.86		-1.70	
255		29.6		0.41	
257		27.3		-0.61	
311		-----		-----	
325	D5185	29		0.15	
331	D5185Mod.	27		-0.75	
333	D5185	30		0.59	
343	D5185	28		-0.30	
349	D5185	29		0.15	
421	D5185	26.6		-0.92	
451	D5185	26		-1.19	
496	D5185	28.47		-0.09	
511		-----		-----	
512		-----		-----	
542	D6595	36	ex	3.27	test result excluded, see §4.1
562	D6595	34	C	2.38	first reported 36
575	D6595	32.92		1.90	
614	D5185	27.17		-0.67	
633		-----		-----	
634		-----		-----	
657	D5185	29.3		0.28	
663	D5185	29.52		0.38	
780	D5185	28		-0.30	
823		-----		-----	
840	D5185	29.4		0.33	
862	D5185	30		0.59	
863	D5185	31		1.04	
864	D5185	28.6		-0.03	
875	D5185	23		-2.53	
902	D5185	28.2		-0.21	
912	D5185	29.8		0.50	
913		-----		-----	
922	D5185	31		1.04	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.5		-0.52	
1023		-----		-----	
1026	D5185	28.5		-0.08	
1059	In house	24		-2.08	
1146	D5185	26.88		-0.80	
1173	In house	25.29		-1.51	
1201	D5185	30		0.59	
1271	D5185	33.9		2.33	
1278	D5185	29		0.15	
1316	D5185	28.1		-0.25	
1435	D5185	27		-0.75	
1569	D5185	28		-0.30	
1648	D5185	29.0		0.15	
1740	D5185	29.7		0.46	
1743	D5185	30.91		1.00	
1807	D5185	24		-2.08	
1850	In house	21	ex	-3.42	test result excluded, see §4.1
1854	D5185	28.0		-0.30	
1900	D5185	32.242		1.59	
2133	D5185	25.887		-1.24	
6002	D5185	28.8		0.06	
6016	D5185	33		1.93	
6043		28		-0.30	
6044	D5185	29		0.15	
6059	D5185	29.2		0.24	
6115	D6595	35.42		3.01	
6194	D5185	24.3360	ex,C	-1.93	test result excluded, see §4.1. First reported 13.4589
6284	D5185	27.778		-0.40	
6301		-----		-----	

normality	OK
n	54
outliers	0 +3ex
mean (n)	28.671
st.dev. (n)	2.5088
R(calc.)	7.025
st.dev.(D5185:18)	2.2406
R(D5185:18)	6.274

application range: 1 – 40 mg/kg



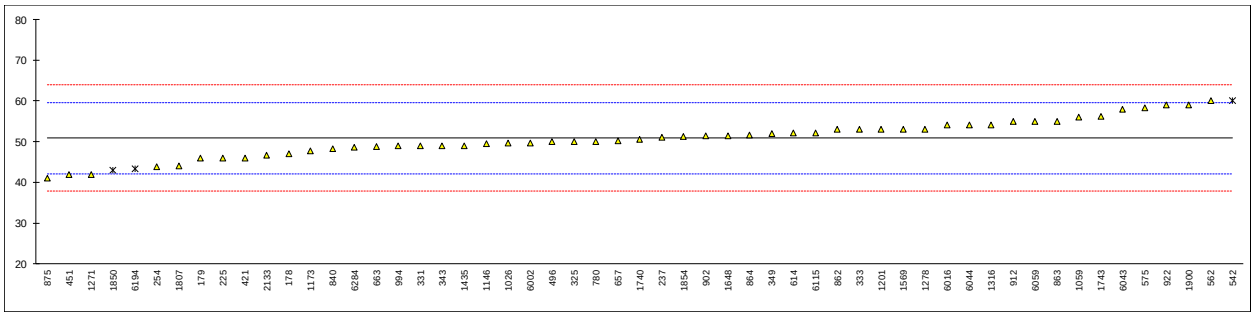


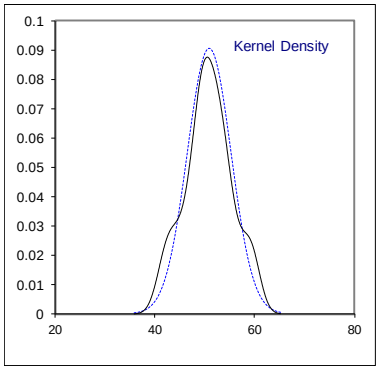
Determination of Copper as Cu on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	47		-0.89	
179	D5185	46		-1.12	
225	D6595	46		-1.12	
230		-----		-----	
237	D5185	51.06		0.04	
254	D5185	43.83		-1.61	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	50		-0.20	
331	D5185Mod.	49		-0.43	
333	D5185	53		0.49	
343	D5185	49		-0.43	
349	D5185	52		0.26	
421	D5185	46.0		-1.12	
451	D5185	42		-2.03	
496	D5185	50.0		-0.20	
511		-----		-----	
512		-----		-----	
542	D6595	60	ex	2.10	test result excluded, see §4.1
562	D6595	60		2.10	
575	D6595	58.36		1.72	
614	D5185	52.11		0.29	
633		-----		-----	
634		-----		-----	
657	D5185	50.2		-0.15	
663	D5185	48.82		-0.47	
780	D5185	50		-0.20	
823		-----		-----	
840	D5185	48.2		-0.61	
862	D5185	53		0.49	
863	D5185	55		0.95	
864	D5185	51.6		0.17	
875	D5185	41		-2.26	
902	D5185	51.4		0.12	
912	D5185	54.9		0.93	
913		-----		-----	
922	D5185	59		1.87	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	48.9		-0.45	
1023		-----		-----	
1026	D5185	49.6		-0.29	
1059	In house	56		1.18	
1146	D5185	49.44		-0.33	
1173	In house	47.75		-0.71	
1201	D5185	53		0.49	
1271	D5185	42		-2.03	
1278	D5185	53.1		0.51	
1316	D5185	54.1		0.74	
1435	D5185	49		-0.43	
1569	D5185	53		0.49	
1648	D5185	51.4		0.12	
1740	D5185	50.6		-0.06	
1743	D5185	56.16		1.21	
1807	D5185	44		-1.57	
1850	In house	43	ex	-1.80	test result excluded, see §4.1
1854	D5185	51.3		0.10	
1900	D5185	59.078		1.88	
2133	D5185	46.661		-0.96	
6002	D5185	49.7		-0.27	
6016	D5185	54		0.72	
6043		58		1.64	
6044	D5185	54		0.72	
6059	D5185	54.9		0.93	
6115	D6595	52.20		0.31	
6194	D5185	43.3815	ex,C	-1.72	test result excluded, see §4.1. First reported 25.6253
6284	D5185	48.608		-0.52	
6301		-----		-----	

normality	OK
n	52
outliers	0 +3ex
mean (n)	50.865
st.dev. (n)	4.4068
R(calc.)	12.339
st.dev.(D5185:18)	4.3599
R(D5185:18)	12.208

application range: 2 – 160 mg/kg



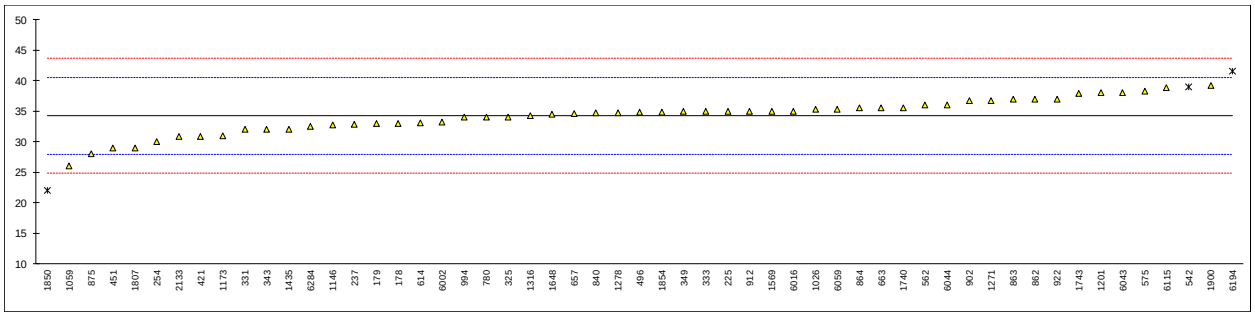


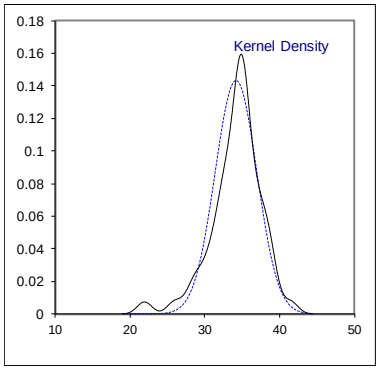
Determination of Iron as Fe on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	33		-0.39	
179	D5185	33		-0.39	
225	D6595	35		0.25	
230		-----		-----	
237	D5185	32.82		-0.45	
254	D5185	30.04		-1.33	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	34		-0.07	
331	D5185Mod.	32		-0.71	
333	D5185	35		0.25	
343	D5185	32		-0.71	
349	D5185	35		0.25	
421	D5185	30.9		-1.06	
451	D5185	29		-1.66	
496	D5185	34.8		0.19	
511		-----		-----	
512		-----		-----	
542	D6595	39	ex	1.53	test result excluded, see §4.1
562	D6595	36		0.57	
575	D6595	38.23		1.28	
614	D5185	33.04		-0.38	
633		-----		-----	
634		-----		-----	
657	D5185	34.6		0.12	
663	D5185	35.55		0.43	
780	D5185	34		-0.07	
823		-----		-----	
840	D5185	34.7		0.15	
862	D5185	37		0.89	
863	D5185	37		0.89	
864	D5185	35.5		0.41	
875	D5185	28		-1.98	
902	D5185	36.7		0.79	
912	D5185	35.0		0.25	
913		-----		-----	
922	D5185	37		0.89	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	33.97		-0.08	
1023		-----		-----	
1026	D5185	35.3		0.35	
1059	In house	26		-2.62	
1146	D5185	32.74		-0.47	
1173	In house	30.96		-1.04	
1201	D5185	38		1.21	
1271	D5185	36.7		0.79	
1278	D5185	34.7		0.15	
1316	D5185	34.3		0.03	
1435	D5185	32		-0.71	
1569	D5185	35		0.25	
1648	D5185	34.5		0.09	
1740	D5185	35.6		0.44	
1743	D5185	37.90		1.18	
1807	D5185	29		-1.66	
1850	In house	22	R(0.01)	-3.90	
1854	D5185	34.8		0.19	
1900	D5185	39.222		1.60	
2133	D5185	30.899		-1.06	
6002	D5185	33.2		-0.32	
6016	D5185	35		0.25	
6043		38		1.21	
6044	D5185	36		0.57	
6059	D5185	35.3		0.35	
6115	D6595	38.78		1.46	
6194	D5185	41.5193	ex,C	2.33	test result excluded, see §4.1. First reported 16.4418
6284	D5185	32.498		-0.55	
6301		-----		-----	

normality	OK
n	52
outliers	1 +2ex
mean (n)	34.216
st.dev. (n)	2.7896
R(calc.)	7.811
st.dev.(D5185:18)	3.1350
R(D5185:18)	8.778

application range: 2 – 140 mg/kg



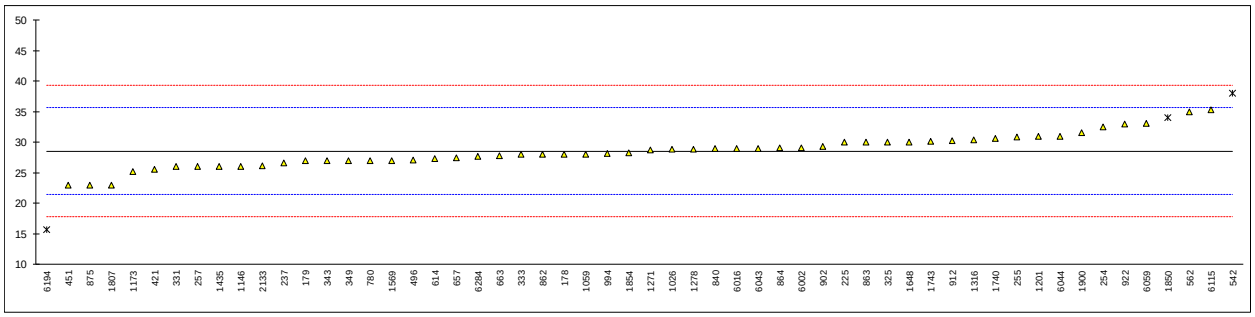


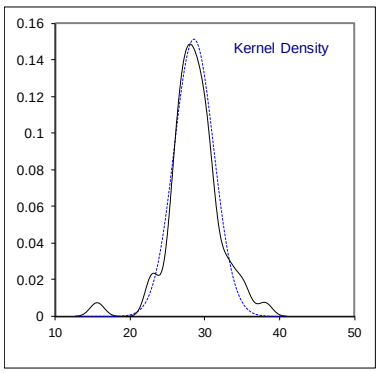
Determination of Lead as Pb on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	28		-0.15	
179	D5185	27		-0.43	
225	D6595	30		0.41	
230		-----		-----	
237	D5185	26.58		-0.55	
254	D5185	32.48		1.10	
255		30.85		0.64	
257		26.0		-0.71	
311		-----		-----	
325	D5185	30		0.41	
331	D5185Mod.	26		-0.71	
333	D5185	28		-0.15	
343	D5185	27		-0.43	
349	D5185	27		-0.43	
421	D5185	25.6		-0.82	
451	D5185	23		-1.55	
496	D5185	27.1		-0.40	
511		-----		-----	
512		-----		-----	
542	D6595	38	ex	2.64	test result excluded, see §4.1
562	D6595	35		1.80	
575		-----		-----	
614	D5185	27.32		-0.34	
633		-----		-----	
634		-----		-----	
657	D5185	27.4		-0.32	
663	D5185	27.76		-0.22	
780	D5185	27		-0.43	
823		-----		-----	
840	D5185	29.0		0.13	
862	D5185	28		-0.15	
863	D5185	30		0.41	
864	D5185	29.1		0.16	
875	D5185	23		-1.55	
902	D5185	29.3		0.21	
912	D5185	30.2		0.46	
913		-----		-----	
922	D5185	33		1.24	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	28.1		-0.12	
1023		-----		-----	
1026	D5185	28.9		0.10	
1059	In house	28		-0.15	
1146	D5185	26.07		-0.69	
1173	In house	25.19		-0.94	
1201	D5185	31		0.69	
1271	D5185	28.7	C	0.04	first reported 38,1
1278	D5185	28.9		0.10	
1316	D5185	30.4		0.52	
1435	D5185	26		-0.71	
1569	D5185	27		-0.43	
1648	D5185	30.0		0.41	
1740	D5185	30.6		0.57	
1743	D5185	30.15		0.45	
1807	D5185	23		-1.55	
1850	In house	34	ex	1.52	test result excluded, see §4.1
1854	D5185	28.2		-0.10	
1900	D5185	31.589		0.85	
2133	D5185	26.083		-0.69	
6002	D5185	29.1		0.16	
6016	D5185	29		0.13	
6043		29		0.13	
6044	D5185	31		0.69	
6059	D5185	33.1		1.27	
6115	D6595	35.35		1.90	
6194	D5185	15.6388	C,R(0.01)	-3.60	first reported 12.9214
6284	D5185	27.708		-0.23	
6301		-----		-----	

normality	OK
n	53
outliers	1 +2ex
mean (n)	28.544
st.dev. (n)	2.6367
R(calc.)	7.383
st.dev.(D5185:18)	3.5805
R(D5185:18)	10.026

application range: 10 – 160 mg/kg

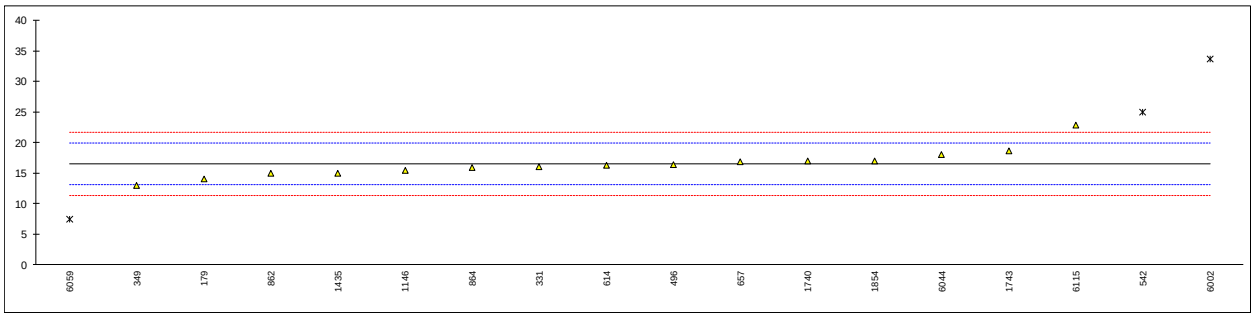


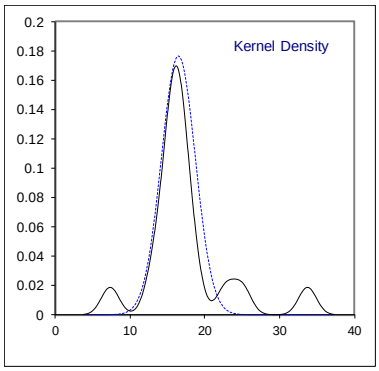


Determination of Lithium as Li on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	14		-1.44	
225		-----		-----	
230		-----		-----	
237		-----		-----	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325		-----		-----	
331	D5185Mod.	16		-0.28	
333		-----		-----	
343		-----		-----	
349	D5185	13	C	-2.02	first reported 0
421		-----		-----	
451		-----		-----	
496	D5185	16.4		-0.05	
511		-----		-----	
512		-----		-----	
542	D6595	25	D(0.05)	4.92	
562		-----		-----	
575		-----		-----	
614	D5185	16.3		-0.11	
633		-----		-----	
634		-----		-----	
657	D5185	16.8		0.18	
663		-----		-----	
780		-----		-----	
823		-----		-----	
840		-----		-----	
862	D5185	15		-0.86	
863		-----		-----	
864	D5185	15.9		-0.34	
875		-----		-----	
902		-----		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146	D5185	15.49		-0.58	
1173		-----		-----	
1201		-----		-----	
1271		-----		-----	
1278		-----		-----	
1316		-----		-----	
1435	D5185	15		-0.86	
1569		-----		-----	
1648		-----		-----	
1740	D5185	17	C	0.30	first reported 27
1743	D5185	18.64		1.24	
1807		-----		-----	
1850		-----		-----	
1854	D5185	17.0		0.30	
1900		-----		-----	
2133		-----		-----	
6002	D6595	33.7	C,D(0.05)	9.95	first reported 200,0
6016		-----		-----	
6043		-----		-----	
6044	D5185	18		0.87	
6059	D5185	7.4	D(0.05)	-5.25	
6115	D6595	22.80		3.65	
6194		-----		-----	
6284		-----		-----	
6301		-----		-----	

normality	not OK
n	15
outliers	3
mean (n)	16.489
st.dev. (n)	2.2644
R(calc.)	6.340
st.dev.(Horwitz)	1.7302
R(Horwitz)	4.845



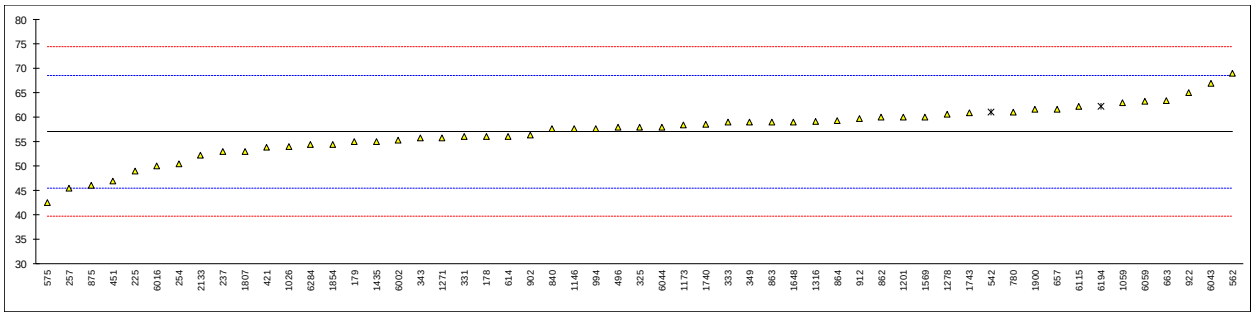


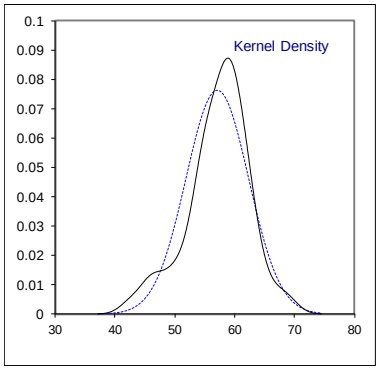
Determination of Magnesium as Mg on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	56		-0.18	
179	D5185	55.0		-0.35	
225	D6595	49		-1.39	
230		-----		-----	
237	D5185	52.96		-0.71	
254	D5185	50.47		-1.14	
255		-----		-----	
257		45.5		-1.99	
311		-----		-----	
325	D5185	58		0.17	
331	D5185Mod.	56		-0.18	
333	D5185	59		0.34	
343	D5185	55.8		-0.21	
349	D5185	59		0.34	
421	D5185	53.8		-0.56	
451	D5185	47		-1.74	
496	D5185	57.93		0.15	
511		-----		-----	
512		-----		-----	
542	D6595	61	ex	0.68	test result excluded, see §4.1
562	D6595	69		2.07	
575	D6595	42.58		-2.50	
614	D5185	56.0		-0.18	
633		-----		-----	
634		-----		-----	
657	D5185	61.7		0.81	
663	D5185	63.37		1.09	
780	D5185	61		0.68	
823		-----		-----	
840	D5185	57.6		0.10	
862	D5185	60		0.51	
863	D5185	59		0.34	
864	D5185	59.3		0.39	
875	D5185	46		-1.91	
902	D5185	56.3		-0.13	
912	D5185	59.8		0.48	
913		-----		-----	
922	D5185	65		1.38	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	57.7		0.11	
1023		-----		-----	
1026	D5185	54		-0.53	
1059	In house	63	C	1.03	first reported 73
1146	D5185	57.67		0.11	
1173	In house	58.36		0.23	
1201	D5185	60		0.51	
1271	D5185	55.8	C	-0.21	first reported 78
1278	D5185	60.58		0.61	
1316	D5185	59.1		0.36	
1435	D5185	55		-0.35	
1569	D5185	60		0.51	
1648	D5185	59.0		0.34	
1740	D5185	58.5		0.25	
1743	D5185	60.91		0.67	
1807	D5185	53		-0.70	
1850		-----		-----	
1854	D5185	54.5		-0.44	
1900	D5185	61.584		0.78	
2133	D5185	52.165		-0.84	
6002	D5185	55.3		-0.30	
6016	D5185	50		-1.22	
6043		67		1.72	
6044	D5185	58		0.17	
6059	D5185	63.3		1.08	
6115	D6595	62.20		0.89	
6194	D5185	62.2057	ex,C	0.89	test result excluded, see §4.1. First reported 29.1526
6284	D5185	54.424		-0.45	
6301		-----		-----	

normality	OK
n	53
outliers	0 +2ex
mean (n)	57.042
st.dev. (n)	5.2425
R(calc.)	14.679
st.dev.(D5185:18)	5.7868
R(D5185:18)	16.203

application range: 5 – 1700 mg/kg



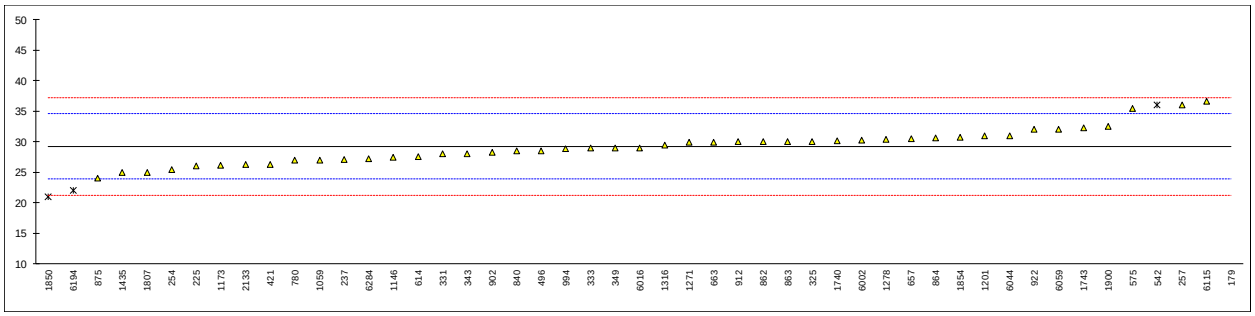


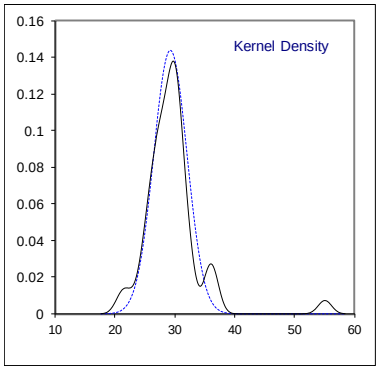
Determination of Manganese as Mn on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	55	R(0.01)	9.68	
225	D6595	26		-1.21	
230		-----		-----	
237	D5185	27.04		-0.82	
254	D5185	25.38		-1.44	
255		-----		-----	
257		36.0		2.55	
311		-----		-----	
325	D5185	30		0.29	
331	D5185Mod.	28		-0.46	
333	D5185	29		-0.08	
343	D5185	28		-0.46	
349	D5185	29		-0.08	
421	D5185	26.3		-1.10	
451		-----		-----	
496	D5185	28.5		-0.27	
511		-----		-----	
512		-----		-----	
542	D6595	36	ex	2.55	test result excluded, see §4.1
562		-----		-----	
575	D6595	35.44		2.33	
614	D5185	27.5		-0.65	
633		-----		-----	
634		-----		-----	
657	D5185	30.47		0.47	
663	D5185	29.95		0.27	
780	D5185	27		-0.83	
823		-----		-----	
840	D5185	28.5		-0.27	
862	D5185	30		0.29	
863	D5185	30		0.29	
864	D5185	30.6		0.52	
875	D5185	24		-1.96	
902	D5185	28.3		-0.34	
912	D5185	30.0		0.29	
913		-----		-----	
922	D5185	32		1.04	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	28.8		-0.16	
1023		-----		-----	
1026		-----		-----	
1059	In house	27		-0.83	
1146	D5185	27.47		-0.66	
1173	In house	26.10		-1.17	
1201	D5185	31		0.67	
1271	D5185	29.9		0.26	
1278	D5185	30.4		0.44	
1316	D5185	29.4		0.07	
1435	D5185	25		-1.58	
1569		-----		-----	
1648		-----		-----	
1740	D5185	30.1		0.33	
1743	D5185	32.28		1.15	
1807	D5185	25		-1.58	
1850	In house	21	ex	-3.08	test result excluded, see §4.1
1854	D5185	30.7		0.56	
1900	D5185	32.478		1.22	
2133	D5185	26.267		-1.11	
6002	D5185	30.2		0.37	
6016	D5185	29		-0.08	
6043		-----		-----	
6044	D5185	31		0.67	
6059	D5185	32.0		1.04	
6115	D6595	36.63		2.78	
6194	D5185	22.0082	ex	-2.71	test result excluded, see §4.1
6284	D5185	27.158		-0.77	
6301		-----		-----	

normality	OK
n	45
outliers	1 +3ex
mean (n)	29.219
st.dev. (n)	2.7741
R(calc.)	7.767
st.dev.(D5185:18)	2.6643
R(D5185:18)	7.460

application range: 5 – 700 mg/kg



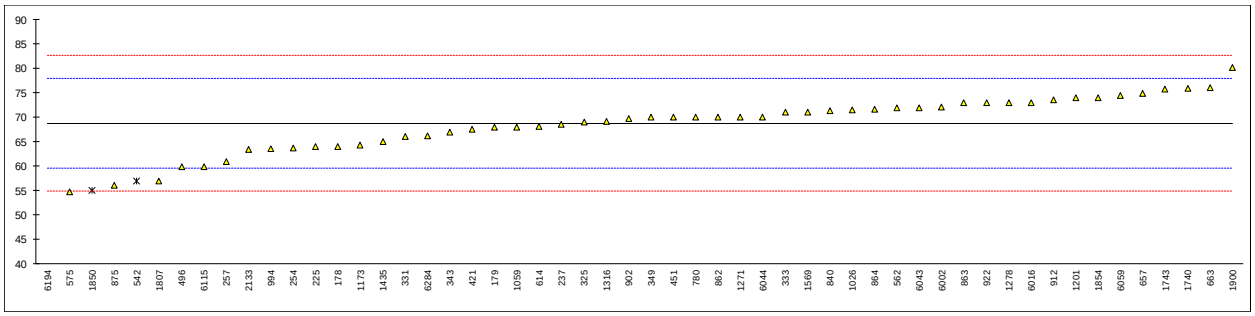


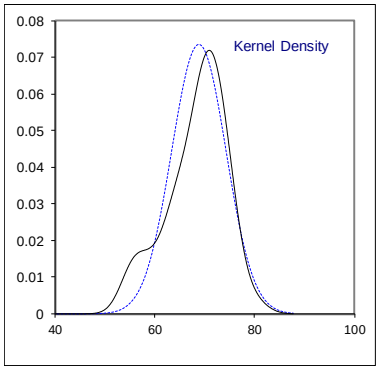
Determination of Molybdenum as Mo on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	64		-1.03	
179	D5185	68		-0.17	
225	D6595	64		-1.03	
230		-----		-----	
237	D5185	68.58		-0.04	
254	D5185	63.65		-1.11	
255		-----		-----	
257		60.95		-1.70	
311		-----		-----	
325	D5185	69		0.05	
331	D5185Mod.	66		-0.60	
333	D5185	71		0.48	
343	D5185	67		-0.38	
349	D5185	70		0.27	
421	D5185	67.5		-0.27	
451	D5185	70		0.27	
496	D5185	59.9		-1.92	
511		-----		-----	
512		-----		-----	
542	D6595	57	ex	-2.55	test result excluded, see §4.1
562	D6595	72		0.70	
575	D6595	54.67		-3.06	
614	D5185	68.09		-0.15	
633		-----		-----	
634		-----		-----	
657	D5185	74.9		1.33	
663	D5185	76.08		1.59	
780	D5185	70		0.27	
823		-----		-----	
840	D5185	71.3		0.55	
862	D5185	70		0.27	
863	D5185	73		0.92	
864	D5185	71.6		0.61	
875	D5185	56		-2.77	
902	D5185	69.8		0.22	
912	D5185	73.6		1.05	
913		-----		-----	
922	D5185	73		0.92	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	63.6		-1.12	
1023		-----		-----	
1026	D5185	71.5		0.59	
1059	In house	68		-0.17	
1146		-----		-----	
1173	In house	64.35		-0.96	
1201	D5185	74		1.14	
1271	D5185	70		0.27	
1278	D5185	73.0		0.92	
1316	D5185	69.1		0.07	
1435	D5185	65		-0.82	
1569	D5185	71		0.48	
1648		-----		-----	
1740	D5185	75.9		1.55	
1743	D5185	75.72		1.51	
1807	D5185	57		-2.55	
1850	In house	55	ex	-2.99	test result excluded, see §4.1
1854	D5185	74.0		1.14	
1900	D5185	80.124		2.46	
2133	D5185	63.440		-1.16	
6002	D5185	72.1		0.72	
6016	D5185	73		0.92	
6043		72		0.70	
6044	D5185	70		0.27	
6059	D5185	74.5		1.24	
6115	D6595	59.94		-1.92	
6194	D5185	29.9195	C,R(0.01)	-8.43	first reported 37.1120
6284	D5185	66.24		-0.55	
6301		-----		-----	

normality	OK
n	51
outliers	1 +2ex
mean (n)	68.767
st.dev. (n)	5.4312
R(calc.)	15.207
st.dev.(D5185:18)	4.6085
R(D5185:18)	12.904

application range: 5 – 200 mg/kg



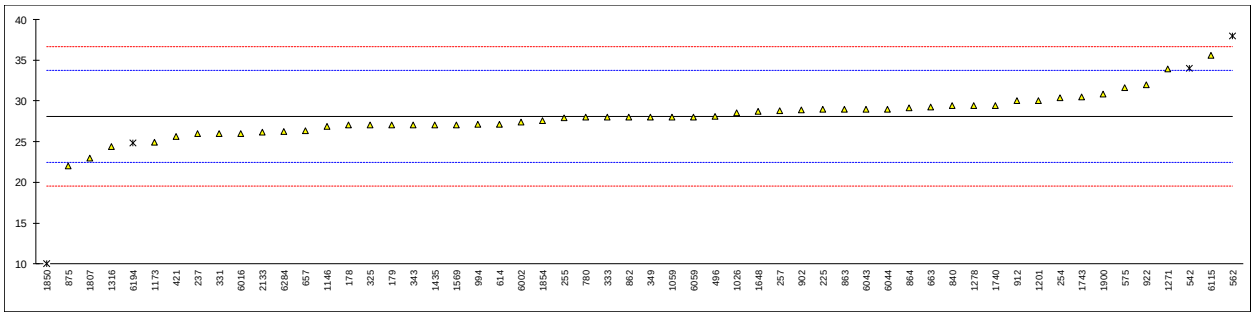


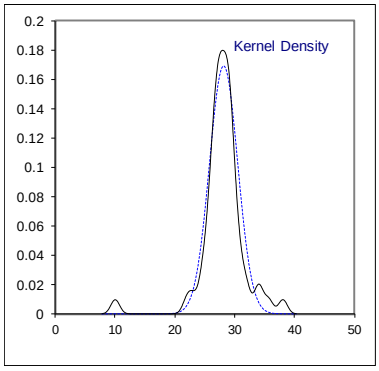
Determination of Nickel as Ni on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	27		-0.39	
179	D5185	27		-0.39	
225	D6595	29		0.32	
230		-----		-----	
237	D5185	26.00		-0.74	
254	D5185	30.40		0.81	
255		27.92		-0.06	
257		28.8		0.25	
311		-----		-----	
325	D5185	27		-0.39	
331	D5185Mod.	26		-0.74	
333	D5185	28		-0.03	
343	D5185	27		-0.39	
349	D5185	28		-0.03	
421	D5185	25.6		-0.88	
451		-----		-----	
496	D5185	28.1		0.00	
511		-----		-----	
512		-----		-----	
542	D6595	34	ex	2.08	test result excluded, see §4.1
562	D6595	38	C,R(0.05)	3.49	first reported 39
575	D6595	31.66		1.25	
614	D5185	27.16		-0.33	
633		-----		-----	
634		-----		-----	
657	D5185	26.3		-0.63	
663	D5185	29.21		0.39	
780	D5185	28		-0.03	
823		-----		-----	
840	D5185	29.4		0.46	
862	D5185	28		-0.03	
863	D5185	29		0.32	
864	D5185	29.2		0.39	
875	D5185	22		-2.15	
902	D5185	28.9		0.28	
912	D5185	30.0		0.67	
913		-----		-----	
922	D5185	32		1.37	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.1		-0.35	
1023		-----		-----	
1026	D5185	28.5		0.14	
1059	In house	28		-0.03	
1146	D5185	26.85		-0.44	
1173	In house	24.92		-1.12	
1201	D5185	30		0.67	
1271	D5185	33.9		2.04	
1278	D5185	29.4		0.46	
1316	D5185	24.4		-1.30	
1435	D5185	27		-0.39	
1569	D5185	27		-0.39	
1648	D5185	28.7		0.21	
1740	D5185	29.4		0.46	
1743	D5185	30.46		0.83	
1807	D5185	23		-1.80	
1850	In house	10	R(0.01)	-6.37	
1854	D5185	27.6		-0.18	
1900	D5185	30.793		0.95	
2133	D5185	26.125		-0.69	
6002	D5185	27.4		-0.25	
6016	D5185	26		-0.74	
6043		29		0.32	
6044	D5185	29		0.32	
6059	D5185	28.0		-0.03	
6115	D6595	35.62		2.65	
6194	D5185	24.8519	ex,C	-1.14	test result excluded, see §4.1. First reported 12.7238
6284	D5185	26.236		-0.66	
6301		-----		-----	

normality	not OK
n	52
outliers	2 +2ex
mean (n)	28.097
st.dev. (n)	2.3617
R(calc.)	6.613
st.dev.(D5185:18)	2.8396
R(D5185:18)	7.951

application range: 5 – 40 mg/kg





Determination of Potassium as K on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	<1.0		-----	
225	D6595	0.9		-----	
230		-----		-----	
237	D5185	1.040		-----	
254		-----		-----	
255		-----		-----	
257		1.2		-----	
311		-----		-----	
325	D5185	3		-----	
331	D5185Mod.	3		-----	
333	D5185	1		-----	
343	D5185	<0,1		-----	
349		-----		-----	
421	D5185	<1,0		-----	
451	D5185	0		-----	
496	D5185	0.70		-----	
511		-----		-----	
512		-----		-----	
542	D6595	0.90		-----	
562	D6595	1		-----	
575		-----		-----	
614	D5185	<1		-----	
633		-----		-----	
634		-----		-----	
657	D5185	1.2		-----	
663	D5185	2.4	C	-----	first reported 5.69
780	D5185	2		-----	
823		-----		-----	
840	D5185	<5		-----	
862	D5185	<1		-----	
863	D5185	<1		-----	
864	D5185	<1		-----	
875		-----		-----	
902	D5185	<40		-----	
912		-----		-----	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994		-----		-----	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146		-----		-----	
1173		-----		-----	
1201	D5185	0		-----	
1271	D5185	0.2		-----	
1278	D5185	1.86		-----	
1316	D5185	5.18		-----	
1435	D5185	2		-----	
1569		-----		-----	
1648		-----		-----	
1740	D5185	<1		-----	
1743	D5185	0		-----	
1807		-----		-----	
1850		-----		-----	
1854		-----		-----	
1900	D5185	0		-----	
2133		-----		-----	
6002	D5185	1.31		-----	
6016	D5185	<1		-----	
6043		-----		-----	
6044		-----		-----	
6059	D5185	1.5		-----	
6115	D6595	0.771		-----	
6194		-----		-----	
6284	D5185	1.31372		-----	
6301		-----		-----	
	n	35			
	mean (n)	<40			application range: 40 – 1200 mg/kg

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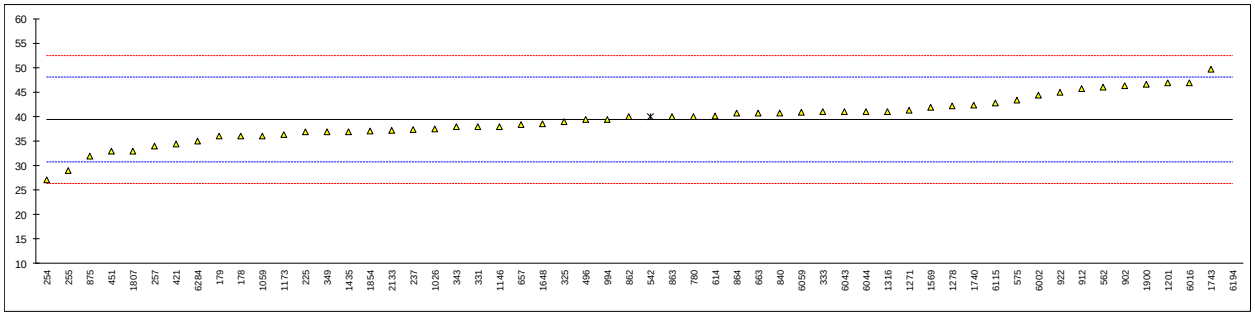
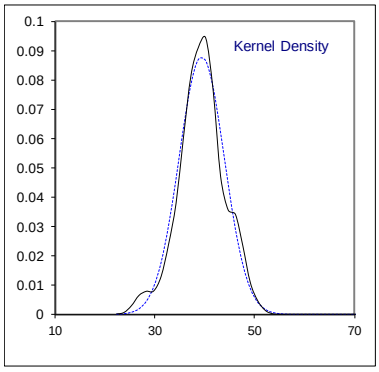
Determination of Silicon as Si on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	36		-0.79	
179	D5185	36		-0.79	
225	D6595	37		-0.56	
230		-----		-----	
237	D5185	37.34		-0.49	
254	D5185	27.03		-2.86	
255		28.99		-2.41	
257		34.0		-1.25	
311		-----		-----	
325	D5185	39		-0.10	
331	D5185Mod.	38		-0.33	
333	D5185	41		0.36	
343	D5185	38		-0.33	
349	D5185	37		-0.56	
421	D5185	34.5		-1.14	
451	D5185	33		-1.49	
496	D5185	39.4		-0.01	
511		-----		-----	
512		-----		-----	
542	D6595	40	ex	0.13	test result excluded, see §4.1
562	D6595	46		1.51	
575	D6595	43.36		0.90	
614	D5185	40.23		0.18	
633		-----		-----	
634		-----		-----	
657	D5185	38.4		-0.24	
663	D5185	40.72		0.29	
780	D5185	40		0.13	
823		-----		-----	
840	D5185	40.8		0.31	
862	D5185	40		0.13	
863	D5185	40		0.13	
864	D5185	40.7		0.29	
875	D5185	32		-1.72	
902	D5185	46.3		1.58	
912	D5185	45.7		1.44	
913		-----		-----	
922	D5185	45		1.28	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	39.5		0.01	
1023		-----		-----	
1026	D5185	37.5		-0.45	
1059	In house	36		-0.79	
1146	D5185	38.01		-0.33	
1173	In house	36.31		-0.72	
1201	D5185	47		1.74	
1271	D5185	41.3		0.43	
1278	D5185	42.2		0.63	
1316	D5185	41.1		0.38	
1435	D5185	37		-0.56	
1569	D5185	42		0.59	
1648	D5185	38.5		-0.22	
1740	D5185	42.4		0.68	
1743	D5185	49.70		2.36	
1807	D5185	33		-1.49	
1850		-----		-----	
1854	D5185	37.1		-0.54	
1900	D5185	46.664		1.66	
2133	D5185	37.294		-0.50	
6002	D5185	44.4		1.14	
6016	D5185	47		1.74	
6043		41		0.36	
6044	D5185	41		0.36	
6059	D5185	40.9		0.33	
6115	D6595	42.87		0.79	
6194	D5185	397.5462	C,R(0.01)	82.47	first reported 20.6308
6284	D5185	34.996		-1.03	
6301		-----		-----	

normality	OK
n	54
outliers	1 +1ex
mean (n)	39.448
st.dev. (n)	4.5432
R(calc.)	12.721
st.dev.(D5185:18)	4.3420
R(D5185:18)	12.158

application range: 8 – 50 mg/kg



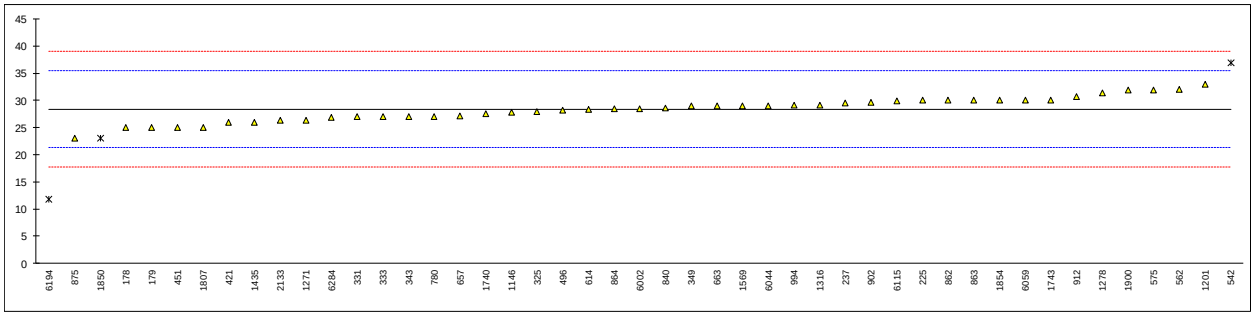


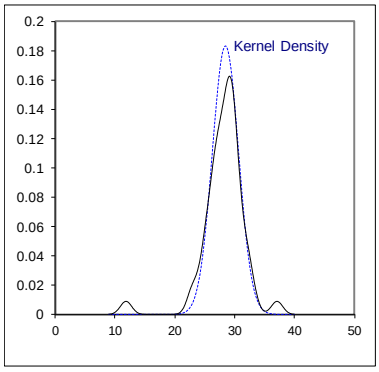
Determination of Silver as Ag on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	25		-0.96	
179	D5185	25		-0.96	
225	D6595	30		0.45	
230		-----		-----	
237	D5185	29.47		0.30	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	28		-0.11	
331	D5185Mod.	27		-0.40	
333	D5185	27		-0.40	
343	D5185	27		-0.40	
349	D5185	29		0.17	
421	D5185	26.0		-0.68	
451	D5185	25		-0.96	
496	D5185	28.2		-0.06	
511		-----		-----	
512		-----		-----	
542	D6595	37	R(0.05)	2.42	
562	D6595	32		1.01	
575	D6595	31.96		1.00	
614	D5185	28.4		0.00	
633		-----		-----	
634		-----		-----	
657	D5185	27.2		-0.34	
663	D5185	29	C	0.17	first reported 63.19
780	D5185	27		-0.40	
823		-----		-----	
840	D5185	28.6		0.05	
862	D5185	30		0.45	
863	D5185	30		0.45	
864	D5185	28.5		0.03	
875	D5185	23		-1.52	
902	D5185	29.6		0.34	
912	D5185	30.7		0.65	
913		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	29.2		0.22	
1023		-----		-----	
1026		-----		-----	
1059		-----		-----	
1146	D5185	27.78		-0.18	
1173		-----		-----	
1201	D5185	33		1.29	
1271	D5185	26.4		-0.56	
1278	D5185	31.4		0.84	
1316	D5185	29.2		0.22	
1435	D5185	26		-0.68	
1569	D5185	29		0.17	
1648		-----		-----	
1740	D5185	27.5		-0.25	
1743	D5185	30.11		0.48	
1807	D5185	25		-0.96	
1850	In house	23	ex	-1.52	test result excluded, see §4.1
1854	D5185	30.0		0.45	
1900	D5185	31.952		1.00	
2133	D5185	26.363		-0.58	
6002	D5185	28.5		0.03	
6016		-----		-----	
6043		-----		-----	
6044	D5185	29		0.17	
6059	D5185	30.0		0.45	
6115	D6595	29.88		0.42	
6194	D5185	11.8222	C,R(0.01)	-4.67	first reported 13.5907
6284	D5185	26.918		-0.42	
6301		-----		-----	

normality	OK
n	44
outliers	2 +1ex
mean (n)	28.405
st.dev. (n)	2.1830
R(calc.)	6.112
st.dev.(D5185:18)	3.5507
R(D5185:18)	9.942

application range: 0.5 – 50 mg/kg



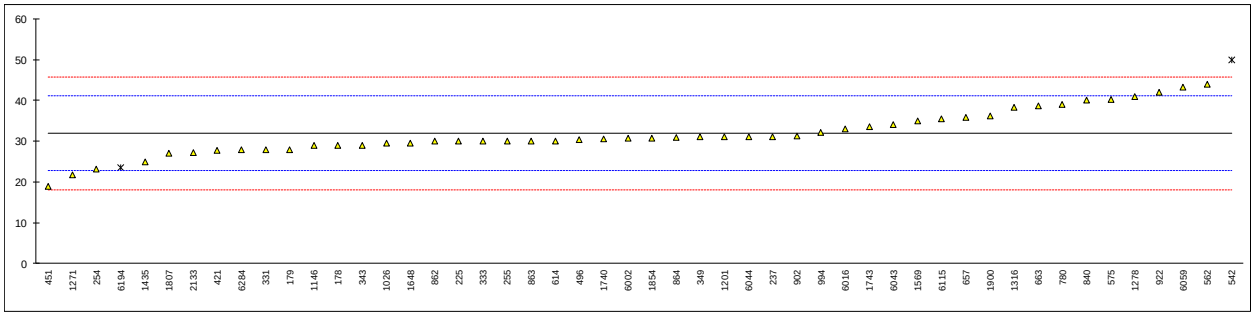


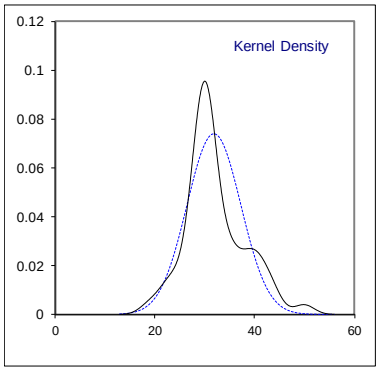
Determination of Sodium as Na on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	29		-0.63	
179	D5185	28		-0.85	
225	D6595	30		-0.41	
230		-----		-----	
237	D5185	31.02		-0.19	
254	D5185	23.17		-1.90	
255		30.0		-0.41	
257		-----		-----	
311		-----		-----	
325		-----		-----	
331	D5185Mod.	28		-0.85	
333	D5185	30		-0.41	
343	D5185	29		-0.63	
349	D5185	31		-0.20	
421	D5185	27.7		-0.91	
451	D5185	19		-2.81	
496	D5185	30.3		-0.35	
511		-----		-----	
512		-----		-----	
542	D6595	50	ex	3.94	test result excluded, see §4.1
562	D6595	44	C	2.64	first reported 45
575	D6595	40.33	C	1.84	first reported 49.33
614	D5185	30.1		-0.39	
633		-----		-----	
634		-----		-----	
657	D5185	35.9		0.87	
663	D5185	38.59		1.46	
780	D5185	39		1.55	
823		-----		-----	
840	D5185	40.1		1.79	
862	D5185	30		-0.41	
863	D5185	30		-0.41	
864	D5185	30.9		-0.22	
875		-----		-----	
902	D5185	31.2		-0.15	
912		-----		-----	
913		-----		-----	
922	D5185	42		2.20	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	32.2		0.07	
1023		-----		-----	
1026	D5185	29.5		-0.52	
1059		-----		-----	
1146	D5185	28.93		-0.65	
1173		-----		-----	
1201	D5185	31		-0.20	
1271	D5185	21.8		-2.20	
1278	D5185	41.0		1.98	
1316	D5185	38.3		1.39	
1435	D5185	25		-1.50	
1569	D5185	35		0.68	
1648	D5185	29.5		-0.52	
1740	D5185	30.6		-0.28	
1743	D5185	33.48		0.34	
1807	D5185	27		-1.07	
1850		-----		-----	
1854	D5185	30.8		-0.24	
1900	D5185	36.237		0.95	
2133	D5185	27.218		-1.02	
6002	D5185	30.7		-0.26	
6016	D5185	33		0.24	
6043		34		0.46	
6044	D5185	31		-0.20	
6059	D5185	43.2		2.46	
6115	D6595	35.42		0.77	
6194	D5185	23.5447	ex,C	-1.82	test result excluded, see §4.1. First reported 16.1358
6284	D5185	27.922		-0.87	
6301		-----		-----	

normality	OK
n	48
outliers	0 +2ex
mean (n)	31.898
st.dev. (n)	5.3999
R(calc.)	15.120
st.dev.(D5185:18)	4.5910
R(D5185:18)	12.855

application range: 7 – 70 mg/kg



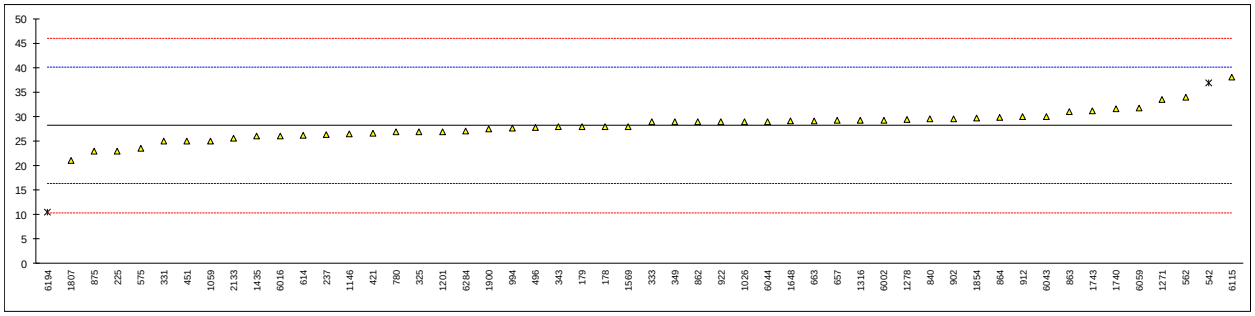


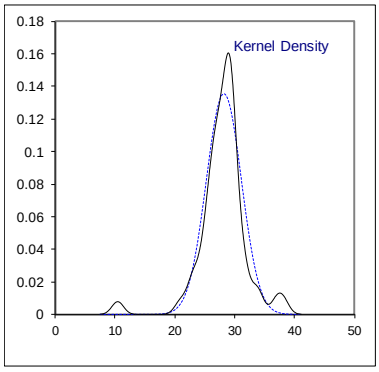
Determination of Tin as Sn on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	28		-0.04	
179	D5185	28		-0.04	
225	D6595	23		-0.88	
230		-----		-----	
237	D5185	26.31		-0.32	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	27		-0.21	
331	D5185Mod.	25		-0.54	
333	D5185	29		0.13	
343	D5185	28		-0.04	
349	D5185	29		0.13	
421	D5185	26.7		-0.26	
451	D5185	25		-0.54	
496	D5185	27.8		-0.07	
511		-----		-----	
512		-----		-----	
542	D6595	37	ex	1.47	test result excluded, see §4.1
562	D6595	34		0.97	
575	D6595	23.57		-0.78	
614	D5185	26.19		-0.34	
633		-----		-----	
634		-----		-----	
657	D5185	29.3		0.18	
663	D5185	29.11		0.15	
780	D5185	27		-0.21	
823		-----		-----	
840	D5185	29.6		0.23	
862	D5185	29		0.13	
863	D5185	31		0.46	
864	D5185	29.9		0.28	
875	D5185	23		-0.88	
902	D5185	29.6		0.23	
912	D5185	30.0		0.30	
913		-----		-----	
922	D5185	29		0.13	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.7		-0.09	
1023		-----		-----	
1026	D5185	29.0		0.13	
1059	In house	25		-0.54	
1146	D5185	26.52		-0.29	
1173		-----		-----	
1201	D5185	27		-0.21	
1271	D5185	33.6		0.90	
1278	D5185	29.4		0.20	
1316	D5185	29.3		0.18	
1435	D5185	26		-0.38	
1569	D5185	28		-0.04	
1648	D5185	29.1		0.15	
1740	D5185	31.6		0.57	
1743	D5185	31.21		0.50	
1807	D5185	21		-1.22	
1850	In house	<3		<-4.24	possibly a false negative test result?
1854	D5185	29.8		0.26	
1900	D5185	27.564		-0.11	
2133	D5185	25.547		-0.45	
6002	D5185	29.3		0.18	
6016	D5185	26		-0.38	
6043		30		0.30	
6044	D5185	29		0.13	
6059	D5185	31.8		0.60	
6115	D6595	38.17		1.67	
6194	D5185	10.5064	C,R(0.01)	-2.98	first reported 13.1914
6284	D5185	27.122		-0.19	
6301		-----		-----	

normality	not OK
n	50
outliers	1 +1ex
mean (n)	28.236
st.dev. (n)	2.9412
R(calc.)	8.235
st.dev.(D5185:18)	5.9506
R(D5185:18)	16.662

application range: 10 – 40 mg/kg



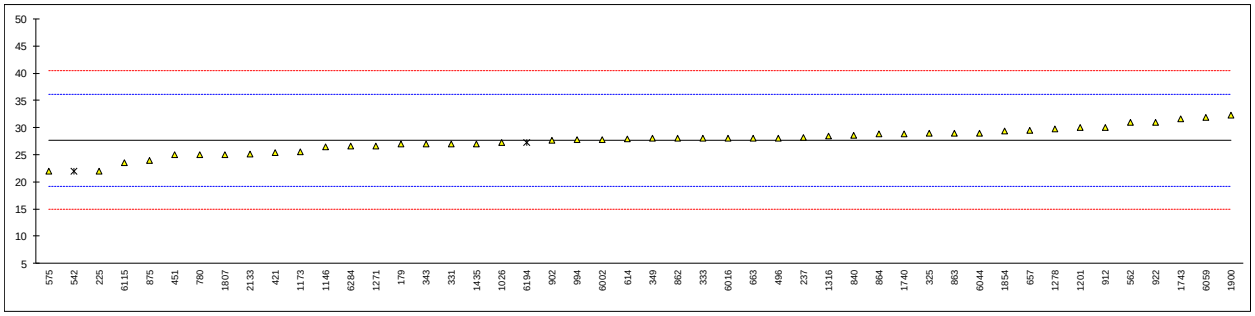


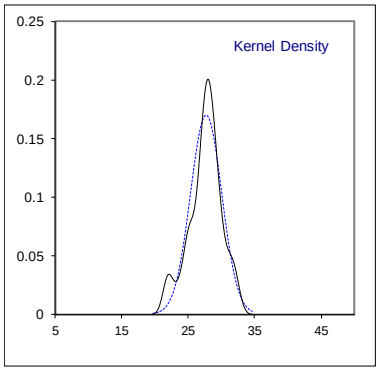
Determination of Titanium as Ti on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178		-----		-----	
179	D5185	27		-0.16	
225	D6595	22		-1.34	
230		-----		-----	
237	D5185	28.17		0.11	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	29		0.31	
331	D5185Mod.	27		-0.16	
333	D5185	28		0.07	
343	D5185	27		-0.16	
349	D5185	28		0.07	
421	D5185	25.4		-0.54	
451	D5185	25		-0.63	
496	D5185	28.1		0.10	
511		-----		-----	
512		-----		-----	
542	D6595	22	ex	-1.34	test result excluded, see §4.1
562	D6595	31		0.78	
575	D6595	21.98		-1.34	
614	D5185	27.9		0.05	
633		-----		-----	
634		-----		-----	
657	D5185	29.497		0.43	
663	D5185	28.04		0.08	
780	D5185	25		-0.63	
823		-----		-----	
840	D5185	28.6		0.22	
862	D5185	28		0.07	
863	D5185	29		0.31	
864	D5185	28.9		0.29	
875	D5185	24		-0.87	
902	D5185	27.6		-0.02	
912	D5185	30.1		0.57	
913		-----		-----	
922	D5185	31		0.78	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.8		0.03	
1023		-----		-----	
1026	D5185	27.2		-0.11	
1059		-----		-----	
1146	D5185	26.48		-0.28	
1173	In house	25.57		-0.50	
1201	D5185	30		0.55	
1271	D5185	26.6	C	-0.25	first reported 4,01
1278	D5185	29.8		0.50	
1316	D5185	28.4		0.17	
1435	D5185	27		-0.16	
1569		-----		-----	
1648		-----		-----	
1740	D5185	28.9		0.29	
1743	D5185	31.63		0.93	
1807	D5185	25		-0.63	
1850		-----		-----	
1854	D5185	29.4		0.40	
1900	D5185	32.287		1.08	
2133	D5185	25.175		-0.59	
6002	D5185	27.8		0.03	
6016	D5185	28		0.07	
6043		-----		-----	
6044	D5185	29		0.31	
6059	D5185	31.9		0.99	
6115	D6595	23.55		-0.97	
6194	D5185	27.2591	ex,C	-0.10	test result excluded, see §4.1. First reported 12.5022
6284	D5185	26.576		-0.26	
6301		-----		-----	

normality	OK
n	46
outliers	0 +2ex
mean (n)	27.682
st.dev. (n)	2.3476
R(calc.)	6.573
st.dev.(D5185:18)	4.2522
R(D5185:18)	11.906

application range: 5 – 40 mg/kg



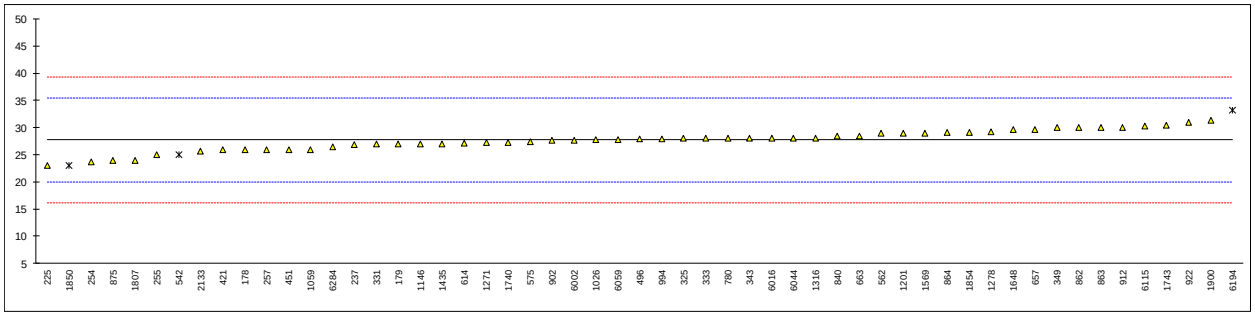


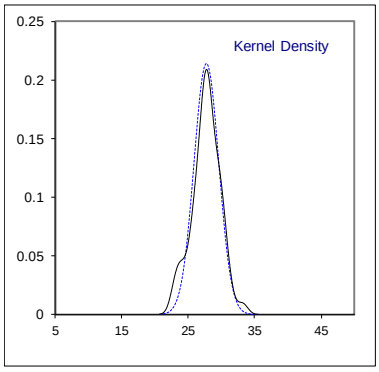
Determination of Vanadium as V on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	26		-0.45	
179	D5185	27		-0.19	
225	D6595	23		-1.22	
230		-----		-----	
237	D5185	26.86		-0.23	
254	D5185	23.64		-1.06	
255		25.0		-0.71	
257		26.0		-0.45	
311		-----		-----	
325	D5185	28		0.07	
331	D5185Mod.	27		-0.19	
333	D5185	28		0.07	
343	D5185	28		0.07	
349	D5185	30		0.59	
421	D5185	25.9		-0.47	
451	D5185	26		-0.45	
496	D5185	27.9		0.04	
511		-----		-----	
512		-----		-----	
542	D6595	25	ex	-0.71	test result excluded, see §4.1
562	D6595	29		0.33	
575	D6595	27.37		-0.09	
614	D5185	27.1		-0.16	
633		-----		-----	
634		-----		-----	
657	D5185	29.7		0.51	
663	D5185	28.44		0.18	
780	D5185	28		0.07	
823		-----		-----	
840	D5185	28.4		0.17	
862	D5185	30		0.59	
863	D5185	30		0.59	
864	D5185	29.1		0.35	
875	D5185	24		-0.97	
902	D5185	27.6		-0.03	
912	D5185	30.0		0.59	
913		-----		-----	
922	D5185	31		0.85	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	27.9		0.04	
1023		-----		-----	
1026	D5185	27.8		0.02	
1059	In house	26		-0.45	
1146	D5185	27.00		-0.19	
1173		-----		-----	
1201	D5185	29		0.33	
1271	D5185	27.2		-0.14	
1278	D5185	29.3		0.41	
1316	D5185	28.1		0.10	
1435	D5185	27		-0.19	
1569	D5185	29		0.33	
1648	D5185	29.6		0.48	
1740	D5185	27.3		-0.11	
1743	D5185	30.44		0.70	
1807	D5185	24		-0.97	
1850	In house	23	ex	-1.22	test result excluded, see §4.1
1854	D5185	29.1		0.35	
1900	D5185	31.298		0.92	
2133	D5185	25.631		-0.54	
6002	D5185	27.7		-0.01	
6016	D5185	28		0.07	
6043		-----		-----	
6044	D5185	28		0.07	
6059	D5185	27.8		0.02	
6115	D6595	30.33		0.67	
6194	D5185	33.1942	ex,C	1.41	test result excluded, see §4.1. First reported 8.7294
6284	D5185	26.5		-0.32	
6301		-----		-----	

normality	OK
n	52
outliers	0 +3ex
mean (n)	27.731
st.dev. (n)	1.8666
R(calc.)	5.226
st.dev.(D5185:18)	3.8660
R(D5185:18)	10.825

application range: 1 – 50 mg/kg



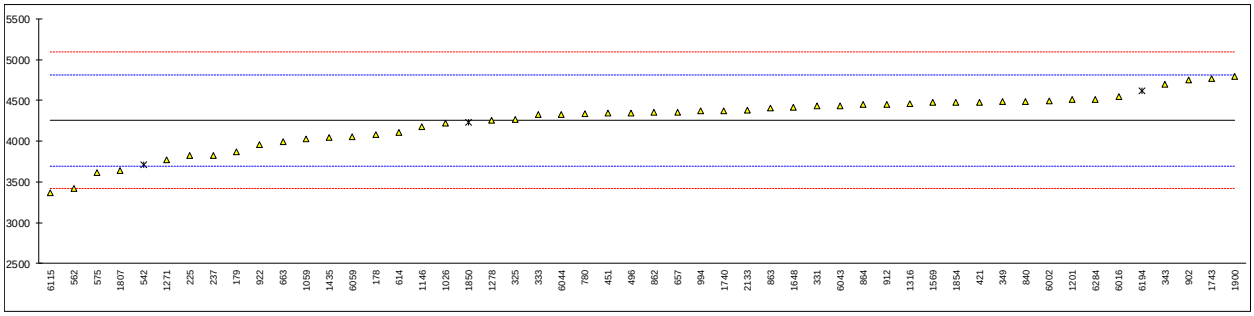


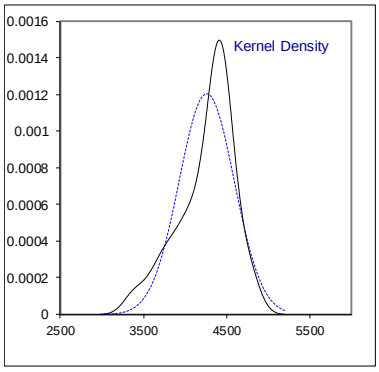
Determination of Calcium as Ca on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	4078		-0.64	
179	D5185	3870		-1.38	
225	D6595	3823		-1.55	
230		-----		-----	
237	D5185	3829		-1.53	
254		-----		-----	
255		-----		-----	
257		-----		-----	
311		-----		-----	
325	D5185	4266		0.03	
331	D5185Mod.	4431		0.62	
333	D5185	4324		0.24	
343	D5185	4696		1.57	
349	D5185	4489		0.83	
421	D5185	4480		0.80	
451	D5185	4343		0.31	
496	D5185	4346		0.32	
511		-----		-----	
512		-----		-----	
542	D6595	3710	ex	-1.95	test result excluded, see §4.1
562	D6595	3417		-3.00	
575	D6595	3610		-2.31	
614	D5185	4109		-0.53	
633		-----		-----	
634		-----		-----	
657	D5185	4351		0.34	
663	D5185	3990.82		-0.95	
780	D5185	4340		0.30	
823		-----		-----	
840	D5185	4490		0.84	
862	D5185	4350		0.33	
863	D5185	4405		0.53	
864	D5185	4447		0.68	
875		-----		-----	
902	D5185	4750		1.76	
912	D5185	4449		0.69	
913		-----		-----	
922	D5185	3959		-1.06	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	4371		0.41	
1023		-----		-----	
1026	D5185	4225		-0.11	
1059	In house	4025		-0.83	
1146	D5185	4178		-0.28	
1173		-----		-----	
1201	D5185	4514		0.92	
1271	D5185	3770	C	-1.74	first reported 5347,8
1278	D5185	4255		0.00	
1316	D5185	4460		0.73	
1435	D5185	4044		-0.76	
1569	D5185	4476		0.79	
1648	D5185	4420.3		0.59	
1740	D5185	4373		0.42	
1743	D5185	4765	C	1.82	first reported 5059,15
1807	D5185	3637		-2.21	
1850	In house	4230	ex	-0.09	test result excluded, see §4.1
1854	D5185	4479		0.80	
1900	D5185	4797.9		1.94	
2133	D5185	4383.004		0.45	
6002	D5185	4492.5		0.84	
6016	D5185	4545		1.03	
6043		4436		0.64	
6044	D5185	4332		0.27	
6059	D5185	4058		-0.71	
6115	D6595	3367		-3.18	
6194	D5185	4620.3887	ex,C	1.30	test result excluded, see §4.1. First reported 2223.4544
6284	D5185	4516.6		0.93	
6301		-----		-----	

normality	OK
n	49
outliers	0 +3ex
mean (n)	4256.390
st.dev. (n)	330.7015
R(calc.)	925.964
st.dev.(D5185:18)	279.6965
R(D5185:18)	783.150

application range: 40 – 9000 mg/kg



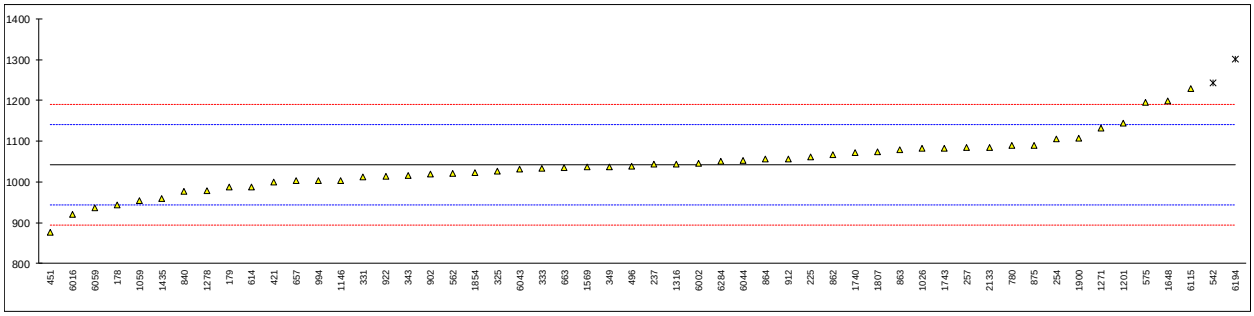


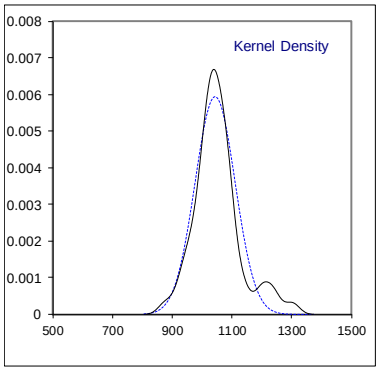
Determination of Phosphorus as P on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	943		-2.00	
179	D5185	987		-1.12	
225	D6595	1062		0.40	
230		-----		-----	
237	D5185	1043		0.01	
254	D5185	1105.21		1.27	
255		-----		-----	
257		1085		0.86	
311		-----		-----	
325	D5185	1027		-0.31	
331	D5185Mod.	1013		-0.59	
333	D5185	1034		-0.17	
343	D5185	1016		-0.53	
349	D5185	1037		-0.11	
421	D5185	999		-0.87	
451	D5185	876		-3.35	
496	D5185	1039		-0.07	
511		-----		-----	
512		-----		-----	
542	D6595	1243	DG(0.05)	4.05	
562	D6595	1021		-0.43	
575	D6595	1195		3.08	
614	D5185	987.0		-1.12	
633		-----		-----	
634		-----		-----	
657	D5185	1003		-0.79	
663	D5185	1035.05		-0.15	
780	D5185	1090		0.96	
823		-----		-----	
840	D5185	977		-1.32	
862	D5185	1066		0.48	
863	D5185	1079		0.74	
864	D5185	1056		0.28	
875	D5185	1090	C	0.96	first reported 1230
902	D5185	1020		-0.45	
912	D5185	1056		0.28	
913		-----		-----	
922	D5185	1014		-0.57	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	1003		-0.79	
1023		-----		-----	
1026	D5185	1082		0.80	
1059	In house	954		-1.78	
1146	D5185	1004		-0.77	
1173		-----		-----	
1201	D5185	1145		2.07	
1271	D5185	1132.5	C	1.82	first reported 1335,2
1278	D5185	978.5	C	-1.29	first reported 1271
1316	D5185	1044		0.03	
1435	D5185	959		-1.68	
1569	D5185	1036		-0.13	
1648	D5185	1199.6		3.17	
1740	D5185	1072		0.60	
1743	D5185	1082.45		0.81	
1807	D5185	1074	C	0.64	first reported 821
1850		-----		-----	
1854	D5185	1022		-0.41	
1900	D5185	1106.5		1.29	
2133	D5185	1085.219		0.87	
6002	D5185	1045.1		0.06	
6016	D5185	920		-2.47	
6043		1031		-0.23	
6044	D5185	1052		0.20	
6059	D5185	937		-2.12	
6115	D6595	1229		3.77	
6194	D5185	1300.6341	C,DG(0.05)	5.21	first reported 602.0746
6284	D5185	1050.8		0.17	
6301		-----		-----	

normality	suspect
n	52
outliers	2
mean (n)	1042.306
st.dev. (n)	67.0492
R(calc.)	187.738
st.dev.(D5185:18)	49.5802
R(D5185:18)	138.825

application range: 10 – 1000 mg/kg



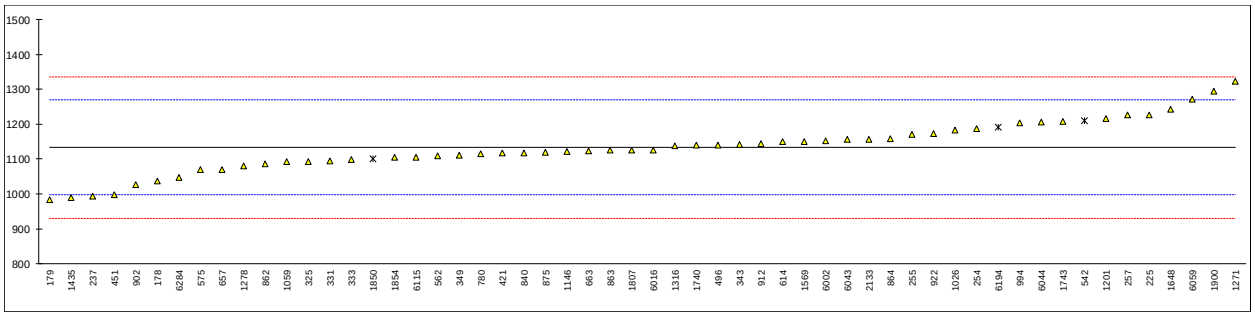


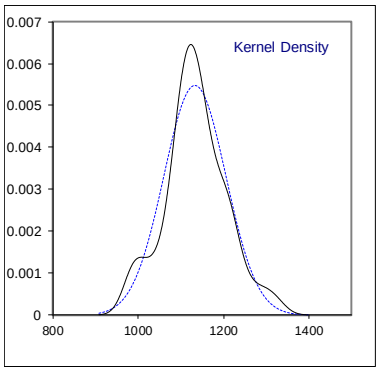
Determination of Zinc as Zn on sample #20077; results in mg/kg

lab	method	value	mark	z(targ)	remarks
178	D5185	1038		-1.40	
179	D5185	984		-2.20	
225	D6595	1227		1.39	
230		-----		-----	
237	D5185	994.5		-2.04	
254	D5185	1188.23		0.81	
255		1171		0.56	
257		1226		1.37	
311		-----		-----	
325	D5185	1093		-0.59	
331	D5185Mod.	1095		-0.56	
333	D5185	1098		-0.52	
343	D5185	1142		0.13	
349	D5185	1112		-0.31	
421	D5185	1117		-0.24	
451	D5185	998		-1.99	
496	D5185	1140.5		0.11	
511		-----		-----	
512		-----		-----	
542	D6595	1210	ex	1.13	test result excluded, see §4.1
562	D6595	1110		-0.34	
575	D6595	1070		-0.93	
614	D5185	1150		0.25	
633		-----		-----	
634		-----		-----	
657	D5185	1071		-0.91	
663	D5185	1124.14		-0.13	
780	D5185	1115		-0.27	
823		-----		-----	
840	D5185	1118		-0.22	
862	D5185	1086		-0.69	
863	D5185	1125		-0.12	
864	D5185	1159		0.38	
875	D5185	1120	C	-0.19	first reported 1390
902	D5185	1026		-1.58	
912	D5185	1145		0.18	
913		-----		-----	
922	D5185	1173		0.59	
962		-----		-----	
963		-----		-----	
974		-----		-----	
994	D5185	1204		1.05	
1023		-----		-----	
1026	D5185	1183		0.74	
1059	In house	1092		-0.60	
1146	D5185	1122		-0.16	
1173		-----		-----	
1201	D5185	1216		1.22	
1271	D5185	1322.3		2.79	
1278	D5185	1080	C	-0.78	first reported 1426
1316	D5185	1137		0.06	
1435	D5185	989		-2.12	
1569	D5185	1151		0.27	
1648	D5185	1242.5		1.61	
1740	D5185	1140		0.10	
1743	D5185	1207.38		1.10	
1807	D5185	1125	C	-0.12	first reported 820
1850	In house	1100	ex	-0.49	test result excluded, see §4.1
1854	D5185	1105		-0.41	
1900	D5185	1295.0		2.39	
2133	D5185	1157.164		0.36	
6002	D5185	1152.3		0.28	
6016	D5185	1125		-0.12	
6043		1157		0.35	
6044	D5185	1205		1.06	
6059	D5185	1272		2.05	
6115	D6595	1106		-0.40	
6194	D5185	1190.9291	ex,C	0.85	test result excluded, see §4.1. First reported 109.7096
6284	D5185	1046.8		-1.27	
6301		-----		-----	

normality	OK
n	53
outliers	0 +3ex
mean (n)	1132.997
st.dev. (n)	72.8752
R(calc.)	204.051
st.dev.(D5185:18)	67.8534
R(D5185:18)	189.989

application range: 60 – 1600 mg/kg





APPENDIX 2

Number of participants per country

1 lab in ARGENTINA
1 lab in AUSTRALIA
1 lab in AZERBAIJAN
2 labs in BELGIUM
1 lab in BOSNIA and HERZEGOVINA
1 lab in BULGARIA
1 lab in CHILE
3 labs in CHINA, People's Republic
1 lab in COLOMBIA
1 lab in COTE D'IVOIRE
1 lab in CROATIA
1 lab in CZECH REPUBLIC
2 labs in DENMARK
3 labs in FRANCE
1 lab in GERMANY
4 labs in GREECE
2 labs in INDIA
1 lab in IRELAND
1 lab in JORDAN
1 lab in KAZAKHSTAN
1 lab in KENYA
2 labs in MALAYSIA
1 lab in MAURITIUS
2 labs in MOROCCO
4 labs in NETHERLANDS
1 lab in NIGERIA
3 labs in NORWAY
1 lab in OMAN
1 lab in PAKISTAN
3 labs in PERU
2 labs in PHILIPPINES
1 lab in POLAND
1 lab in ROMANIA
2 labs in RUSSIAN FEDERATION
2 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SLOVENIA
1 lab in SOUTH KOREA
5 labs in SPAIN
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
2 labs in VIETNAM

APPENDIX 3

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
ex = test result excluded from the statistical evaluation
W = test result withdrawn on request of the participants
fr. = first reported test result
n.a. = not applicable
n.e. = not evaluated
n.d. = not detected
SDS = Safety Data Sheet

Literature

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