Results of Proficiency Test
Vacuum Gasoil
December 2018

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2013, the Institute for Interlaboratory Studies (iis) organizes a proficiency test (PT) for the analysis of Vacuum Gasoil (VGO). During the annual proficiency testing program 2018/2019, it was decided to continue the round robin for the analysis of Vacuum Gasoil in accordance with the latest version of ISO8217.
In this interlaboratory study 71 laboratories in 30 different countries registered for participation. See appendix 3 for the number of participants per country. In this report, the results of the 2018 proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SETUP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser of this proficiency test (PT). Sample analyses for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided to send one sample of 1 L bottle with VGO, labelled #18255. The participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for the statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC 17043:2010 (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 organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of 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

The necessary bulk material Vacuum Gasoil (VGO) was obtained from a local supplier. The approximately 115 litres bulk material was homogenised in a pre-cleaned drum. After homogenisation, 98 amber glass bottles of 1 litre were filled and labelled #18255. The homogeneity of the subsamples #18255 was checked by determination of Density in accordance with ISO12185 on 8 stratified randomly selected samples.

	Density at 15°C in kg/m^3
Sample #18255-1	927.6
Sample #18255-2	927.6
Sample #18255-3	927.2
Sample #18255-4	927.4
Sample #18255-5	927.5
Sample #18255-6	927.4
Sample #18255-7	927.6
Sample #18255-8	927.6

Table 1: homogeneity test results of subsamples #18255

From the above test results, the repeatability was 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.

	Density at 15°C in kg/m^3
r (observed)	0.41
Reference test method	ISO12185:96
0.3 x R(ref. test method)	0.45

Table 2: evaluation of the repeatability of the subsamples #18255

The calculated repeatability was in agreement with 0.3 times the corresponding reproducibility of the reference test method. Therefore, homogeneity of the subsamples #18255 was assumed.

To each of the participating laboratories, one 1 L amber glass bottle, labelled #18255, was sent on November 21, 2018. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Vacuum Gasoil (VGO) packed in amber glass bottles was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were asked to determine on sample #18255: Acid Number (Total), Aniline Point, Asphaltenes, Carbon Residue (Micro method), Density at 15°C, Flash Point PMcc, Kinematic Viscosity at 50°C and at 100°C, Nitrogen, Pour Point (manual or automatic), Sulphur Total, Metals (Arsenic, Calcium, Copper, Iron, Nickel, Silicon, Sodium, Vanadium), Simulated Distillation and Distillation (IBP, 10% rec, 30% rec, 50% rec, 70% rec, 90% rec and FBP). Also, some extra questions regarding the Acid Number Determination were asked.

It was explicitly requested to treat the sample as if it was a routine sample 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 that will be used during the evaluation. The detailed report form and the letter of instructions are both made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The participating laboratories are also requested to confirm the sample receipt on this data entry portal.
The letter of instructions can also be downloaded from the iis website www.iisnl.com.

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in 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 reanalysis). Additional or corrected test results are used for data analysis and the 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 ISO 5725 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 reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. 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 proficiency test, some problems were encountered with the dispatch of the samples to laboratories in Azerbaijan, United States of America and Russian Federation.
Five participants did not report any test results. All reporting laboratories reported on time.
Not all laboratories were able to report all requested parameters. In total 66 participants reported 1113 test results. Observed were 39 outlying test results, which is 3.5% of the numerical test results. 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 TEST

In this section, the reported test results are discussed 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 table together with the original data. The abbreviations, used in these tables, are listed in appendix 4.

In the iis PT reports ASTM methods are referred to with a number (e.g. D611) and an added designation for the year that the method was adopted or revised (e.g. D611:12).
If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D611:12(2016)). In the results tables of appendix 1 only the method number and year of adoption or revision e.g. D611:12 will be used.

Although VGO is an important feedstock for cracking installations, there are few analytical standard methods specifically designed for the analysis of VGO. Most parameters are to be determined by using methods that are intented for residual fuel oil and blending components. Where applicable, precision data for Fuel Oil were used.

Acid Number (Total): This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D664:17a for all 4 modes (60, 125 mL and IP, BEP). When the data reported for Inflection Point (60 and 125 mL) were evaluated separately, the calculated reproducibility is in agreement with the requirements of IP 60 mL and
125 mL. The majority of reporting laboratories reported to use 125 mL IP.

Aniline Point: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with the requirements of ASTM D611:12(2016).
When method B and E were evaluated separately, the calculated reproducibilities were again not in agreement, nor for the group were the Heptane was in specification according to method ASTM D611:12(2016).

Asphaltenes: No significant conclusions were drawn because the precision data of IP143:04 are applicable to values between 0.50 %M/M and 30.0 %M/M.
However, in comparison to the previous proficiency test (iis17G07), the reproducibility of the current PT is small.

Carbon Residue: 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 D4530:15.

Density at 15°C: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ISO 12185:96.

Flash Point PMcc: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with requirements of ASTM D93-B:18.

Kin.Visco. at 50°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D445:18.

Kin.Visco.at 100°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D445:18.

Nitrogen: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with ASTM D5762:18a. When evaluated separately over Gravimetric and Volumetric method the calculated reproducibilities are both in agreement with ASTM D5762:18a.

Pour Point (Manual): This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with ASTM D97:17b.

Pour Point (Automatic): This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with ASTM D5950:14.

Sulphur Total: This determination was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in full agreement with the requirements of ASTM D4294:16e1.

It was observed that the mean of most elements was below the application range of IP501:05 or IP621:16. Nevertheless, it was decided to calculated z-scores as the laboratories were able to measure lower than these limits. The data were normally distributed. The elements (As, Cu and Si) which were not detected are listed in appendix 2.

Calcium (Ca): This determination may be problematic at a level of 0.2 mg/kg. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of IP501:05.

Iron (Fe): This determination was not problematic at a level of 0.2 mg/kg. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of IP621:16.

Nickel (Ni): This determination was not problematic at a level of 0.2 mg/kg. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of IP621:16.

Sodium (Na): This determination was not problematic at a level of 0.4 mg/kg. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of IP621:16.

Vanadium (V): This determination was not problematic at a level of 0.4 mg/kg. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of IP621:16.

Sim. Distillation: The Simulated Distillation according to ASTM D6352 was not problematic. In total seven statistical outliers were observed and four other test results were excluded because the related test values were statistical outliers.
The calculated reproducibilities for Initial Boiling Point, 10%, 30%, 90% recovered and Final Boiling Point after rejection of the suspect data were in agreement with the requirements of ASTM D6352:15. For 50% and 70% recovered the calculated reproducibilities are not in agreement with the requirements of ASTM D6352:15.

Distillation: The distillation according to ASTM D1160 was not problematic. In total four statistical outliers were observed. However, for Initial Boiling Point, 10%, 30%, 50% and 90% recovery the calculated reproducibilities after rejection of the statistical outliers were in agreement with the requirements of ASTM D1160:18. Only for the 70% recovered and Final Boiling Point the calculated reproducibillities after rejection of the ststistical outliers were not in agreement with the requirements of ASTM D1160:18.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Parameter	unit	n	average	2.8 * sd	R(lit)
Acid Number (Total)	mg KOH/g	45	0.18	0.08	0.17
Aniline Point	°C	26	81.6	3.6	1.0
Asphaltenes	%M/M	27	0.036	0.050	(0.007)*
Carbon Residue, Micro method	%M/M	53	0.47	0.25	0.16
Density at 15°C	kg/m^3	61	927.8	1.5	1.5
Flash Point PMcc	°C	44	208.6	10.5	10
Kinematic Viscosity at 50°C	mm^2/s	58	51.565	1.436	4.363
Kinematic Viscosity at 100°C	mm^2/s	54	8.893	0.323	1.073
Nitrogen	mg/kg	40	1516	291	403
Pour Point, manual	°C	46	38.5	3.7	9
Pour Point, automated, Δ3°C	°C	13	37.4	5.5	6.1

Parameter	unit	n	average	2.8 * sd	R(lit)
Sulphur Total	%M/M	63	1.79	0.11	0.11
Calcium as Ca	mg/kg	26	0.2	0.3	0.2
Iron as Fe	mg/kg	35	0.2	0.3	0.4
Nickel as Ni	mg/kg	38	0.2	0.3	0.5
Sodium as Na	mg/kg	40	0.4	0.7	2.3
Vanadium as V	mg/kg	39	0.4	0.3	0.4
Simulated distillation D6352					
- Initial Boiling Point	°C	16	306.9	13.9	49.1
- Temp 10% recovered	°C	18	370.2	7.1	7.1
- Temp 30% recovered	°C	17	415.2	5.6	5.9
- Temp 50% recovered	°C	18	446.5	8.2	6.4
- Temp 70% recovered	°C	18	482.3	8.0	7.2
- Temp 90% recovered	°C	18	529.3	8.9	10.5
- Final Boiling Point	°C	17	597.0	28.2	38.1
Distillation D1160					
- Initial Boiling Point	°C	33	332.7	42.5	49.5
- Temp 10% recovered	°C	35	390.8	13.8	14.7
- Temp 30% recovered	°C	35	424.8	9.5	11.2
- Temp 50% recovered	°C	35	453.8	10.9	11.0
- Temp 70% recovered	°C	35	485.6	11.3	9.4
- Temp 90% recovered	°C	33	531.0	10.6	22.5
- Final Boiling Point	°C	34	555.1	31.1	26.9

Table 3: reproducibilities of results of sample #18255
()* results between brackets should used with care, because the assigned value was below the application range

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF DECEMBER 2018 WITH PREVIOUS PTS

	December 2018	December 2017	December 2016	December 2015	December 2014
Number of reporting labs	66	74	73	54	51
Number of test results	1113	1275	1241	897	785
Number of statistical outliers	39	61	53	22	35
Number of percentage outliers	3.5%	4.8%	4.3%	2.5%	4.5%

Table 4: 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 the following table:

Parameter	December 2018	December 2017	December 2016	December 2015	December 2014
Acid Number (Total)	++	+	++	+	+
Aniline Point	--	--	-	--	--
Asphaltenes	(--)*	(--)*	(--)*	(--)*	(--)*
Carbon Residue, Micro method	-	+/-	-	+/-	--
Density at 15°C	+/-	+/-	+/-	+/-	+/-
Flash Point PMcc	+/-	+	++	+	+/-
Kinematic Viscosity at 50°C	++	++	++	++	--
Kinematic Viscosity at 100°C	++	++	++	++	++
Nitrogen	+	-	+/-	+/-	-
Pour Point, manual	++	++	++	n.e.	n.e.
Pour Point, automated Δ3°C	+	++	++	n.e.	n.e.
Sulphur Total	+/-	+	+	+	+/-
Arsenic as As	n.e.	n.e.	n.e.	n.e.	n.e.
Calcium as Ca	-	+/-	+/-	+/-	--
Copper as Cu	n.e.	n.e.	n.e.	n.e.	n.e.
Iron as Fe	+	+	-	+/-	+
Nickel as Ni	+	++	++	++	+/-
Silicon as Si	n.e.	n.e.	n.e.	--	(--)*
Sodium as Na	++	++	+	+/-	+/-
Vanadium as V	+	++	++	+	++
Simulated distillation D6352					
- Initial Boiling Point	++	+/-	++	+	+/-
- Temp 10% recovered	+/-	-	+	-	-
- Temp 30% recovered	+/-	--	+/-	+/-	-
- Temp 50% recovered	-	-	+	+/-	-
- Temp 70% recovered	-	-	+/-	-	+/-
- Temp 90% recovered	+	-	+/-	-	+/-
- Final Boiling Point	+	--	--	--	-
Distillation D1160					
- Initial Boiling Point	+	+/-	--	-	--
- Temp 10% recovered	+/-	+	-	-	+
- Temp 30% recovered	+	+	-	+	+/-
- Temp 50% recovered	+/-	+	+/-	+/-	+/-
- Temp 70% recovered	-	+	-	-	-
- Temp 90% recovered	++	++	+	+	++
- Final Boiling Point	-	-	-	+/-	-

Table 5: comparison determinations against the reference test methods

()* results between brackets should used with care, because the assigned value was below the application range

The performance of the determinations against the requirements of the respective test methods is listed in the above table. The following performance categories were used:

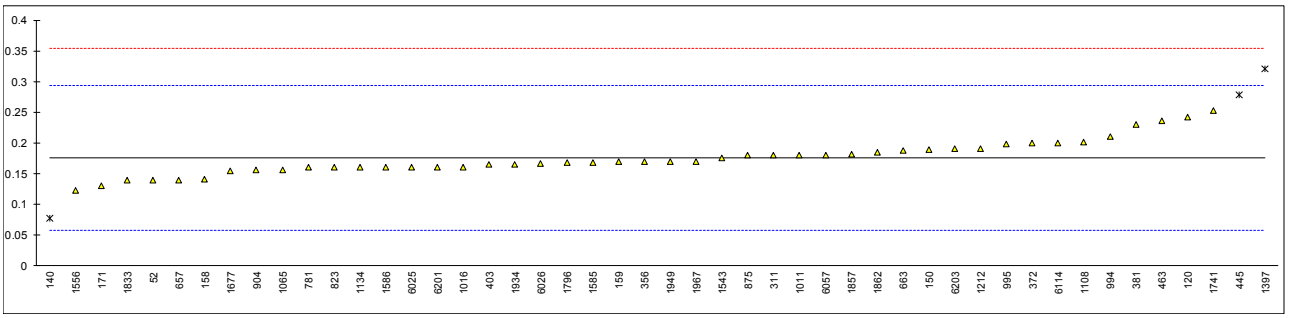
++:	group performed much better than the reference test method
+ :	group performed better than the reference test method
+/-:	group performance equals the reference test method
- :	group performed worse than the reference test method
-- :	group performed much worse than the reference test method
n.e.: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

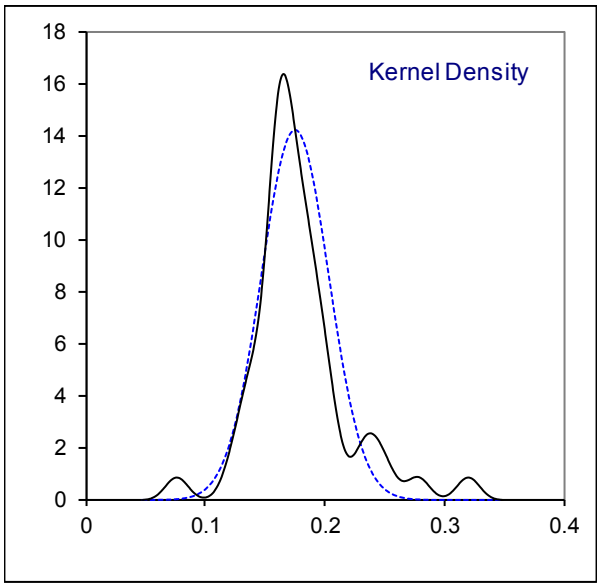
APPENDIX 1

Determination of Acid Number (Total) on sample #18255; results in mg KOH/g

lab	method	value	mark	z(targ)	end point	volume	remarks
52	D664-A	0.14		-0.60	Inflection Point	125 mL	
62		-----		-----	---	---	
120	D664-A	0.242		1.12	---	---	
131		-----		-----	---	---	
140	D664-A	0.077	R(0.05)	-1.67	Inflection Point	125 mL	
150	D664-A	0.189		0.23	---	---	
154		-----		-----	---	---	
158	D664-A	0.141		-0.58	Inflection Point	60 mL	
159	D664-A	0.1692		-0.11	Inflection Point	60 mL	
171	D664-A	0.13		-0.77	Buffer End Point (pH 11)	125 mL	
225		-----		-----	---	---	
311	D664-A	0.18		0.07	---	---	
313		-----		-----	---	---	
317		-----		-----	---	---	
323		-----		-----	---	---	
333		-----		-----	---	---	
334		-----		-----	---	---	
356	D664-A	0.17		-0.09	Inflection Point	125 mL	
372	D664-A	0.2		0.41	Inflection Point	125 mL	
381	INH-6681M	0.23		0.92	---	---	
403	D664-A	0.165		-0.18	---	---	
445	D664-A	0.278	R(0.05)	1.73	Inflection Point	60 mL	
463	D664-A	0.236		1.02	Buffer End Point (pH 11)	125 mL	
657	D664-A	0.14		-0.60	Inflection Point	125 mL	
663	D664-A	0.188		0.21	Inflection Point	125 mL	
732		-----		-----	---	---	
750		-----		-----	---	---	
752		-----		-----	---	---	
781	D664-A	0.16		-0.26	Inflection Point	125 mL	
785		-----		-----	---	---	
798		-----		-----	---	---	
823	D664-A	0.16		-0.26	Inflection Point	125 mL	
874		-----		-----	---	---	
875	D664-A	0.18		0.07	Inflection Point	125 mL	
904	D664-A	0.156		-0.33	Inflection Point	125 mL	
994	D664-A	0.21		0.58	Inflection Point	125 mL	
995	D664-A	0.198		0.38	---	---	
997		-----		-----	---	---	
1011	D664-A	0.18		0.07	Inflection Point	125 mL	
1016	D664-A	0.161		-0.25	---	---	
1065	D664-A	0.156		-0.33	---	---	
1108	D664-A	0.202		0.45	Inflection Point	125 mL	
1134	D664-A	0.16		-0.26	---	---	
1191		-----		-----	---	---	
1212	D664-A	0.191		0.26	Inflection Point	125 mL	
1229		-----		-----	---	---	
1379		-----		-----	---	---	
1397	D664-A	0.32	R(0.01)	2.44	Inflection Point	125 mL	
1543	D664	0.175		-0.01	Inflection Point	125 mL	
1556	D664-A	0.123		-0.89	Inflection Point	125 mL	
1585	D664-A	0.168		-0.13	Inflection Point	125 mL	
1586	D664-A	0.16		-0.26	Inflection Point	125 mL	
1613	D664-A	-----	W	-----	Buffer End Point (pH 11)	---	fr. 0.414
1635		-----		-----	---	---	
1677	D664-A	0.155		-0.35	Inflection Point	---	
1741	ISO6619	0.252		1.29	Inflection Point	100 mL	
1776		-----		-----	---	---	
1796	D664-A	0.1675		-0.14	Buffer End Point (pH 11)	125 mL	
1833	D664-A	0.1389		-0.62	Inflection Point	---	
1857	D664-A	0.182		0.11	Inflection Point	125 mL	
1862	D664-A	0.184		0.14	Inflection Point	125 mL	
1934	D664-A	0.165		-0.18	---	---	
1949	D664-A	0.17		-0.09	Inflection Point	---	
1967	D664-A	0.1703		-0.09	---	---	
6024		-----		-----	---	---	
6025	D664-A	0.16		-0.26	Inflection Point	125 mL	
6026	D664-A	0.1672		-0.14	Inflection Point	125 mL	
6057	D664-A	0.18		0.07	Inflection Point	60 mL	
6114	D664-A	0.20		0.41	Inflection Point	125 mL	
6201	D664-A	0.16		-0.26	Inflection Point	125 mL	
6203	D664-A	0.19		0.24	Inflection Point	125 mL	

		IP (60 + 125 mL) only
normality	OK	Suspect
n	45	31
outliers	3	3
mean (n)	0.1756	0.1727
st.dev. (n)	0.02810	0.02550
R(calc.)	0.0787	0.0714
st.dev.(D664:17a IP 125 mL)	0.05920	0.05905
R(D664:17a IP 125 mL)	0.1658	0.1654
Compare		
R(D664:17a BEP 60 mL)	0.0827	--
R(D664:17a IP 60 mL)	0.0966	0.0953
R(D664:17a BEP 125 mL)	0.0773	--





Determination of Aniline Point on sample #18255; results in °C

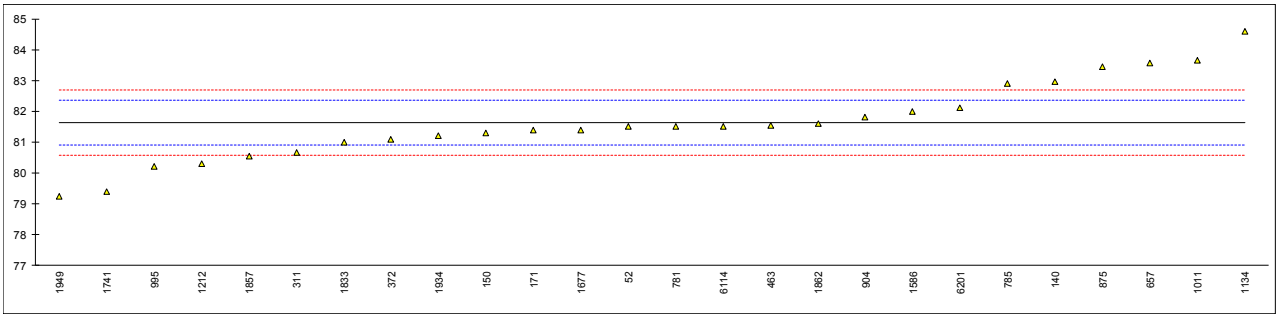
lab	method	value	mark	z(targ)	Heptane	remarks
52	D611-E	81.50		-0.36	69.3	
62		-----		-----	-----	
120		-----		-----	-----	
131		-----		-----	-----	
140	D611-E	82.95		3.70	-----	
150	D611-E	81.3		-0.92	-----	
154		-----		-----	-----	
158		-----		-----	-----	
159		-----		-----	-----	
171	D611-E	81.4		-0.64	-----	
225		-----		-----	-----	
311	D611-E	80.65		-2.74	69.35	
313		-----		-----	-----	
317		-----		-----	-----	
323		-----		-----	-----	
333		-----		-----	-----	
334		-----		-----	-----	
356		-----		-----	-----	
372	D611-E	81.10		-1.48	69.30	
381		-----		-----	-----	
403		-----		-----	-----	
445		-----		-----	-----	
463	D611-B	81.55		-0.22	69.2	
657	D611-B	83.55		5.38	69.5 C	first reported 70.25
663		-----		-----	-----	
732		-----		-----	-----	
750		-----		-----	-----	
752		-----		-----	-----	
781	D611-E	81.50		-0.36	69.10	
785	D611	82.90		3.56	-----	
798		-----		-----	-----	
823		-----		-----	-----	
874		-----		-----	-----	
875	D611-E	83.45		5.10	69.2	
904	D611-A	81.8		0.48	-----	
994		-----		-----	-----	
995	D611-A	80.2		-4.00	-----	
997		-----		-----	-----	
1011	D611-E	83.65		5.66	-----	
1016		-----		-----	-----	
1065		-----		-----	-----	
1108		-----		-----	-----	
1134	D611-B	84.6		8.32	69.4	
1191		-----		-----	-----	
1212	D611-B	80.3		-3.72	69.2	
1229		-----		-----	-----	
1379		-----		-----	-----	
1397		-----		-----	-----	
1543		-----		-----	-----	
1556		-----		-----	-----	
1585		-----		-----	-----	
1586	D611-A	82.0		1.04	-----	
1613		-----		-----	-----	
1635		-----		-----	-----	
1677	D611-A	81.4		-0.64	69.2	
1741	D611-A	79.40		-6.24	-----	
1776		-----		-----	-----	
1796		-----		-----	-----	
1833	D611-E	81.0		-1.76	-----	
1857	D611-E	80.533		-3.07	69.25	
1862	D611-B	81.60		-0.08	-----	
1934	D611-E	81.20		-1.20	-----	
1949	D611-B	79.25		-6.66	69.40	
1967		-----		-----	-----	
6024		-----		-----	-----	
6025		-----		-----	-----	
6026		-----		-----	-----	
6057		-----		-----	-----	
6114	D611-A	81.5		-0.36	69.5	
6201	D611-B	82.10		1.32	69.30	
6203		-----		-----	-----	

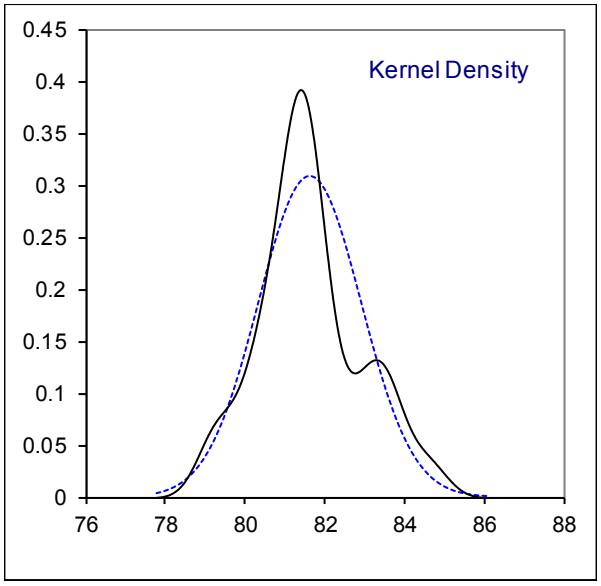
			Only D611-B	Only D611-E	Only Heptane OK
	normality	OK	OK	suspect	OK
	n	26	7	14	14

outliers	0	0	0	0
mean (n)	81.630	81.850	81.686	81.642
st.dev. (n)	1.2867	1.8180	1.0583	1.4149
R(calc.)	3.603	5.090	2.963	3.962
st.dev.(D611:12)	0.3571	0.3571	0.3571	0.3571
R(D611:12)	1.0	1.0	1.0	1.0

Compare

R(iis17G07) 3.165 at a mean of 79.687

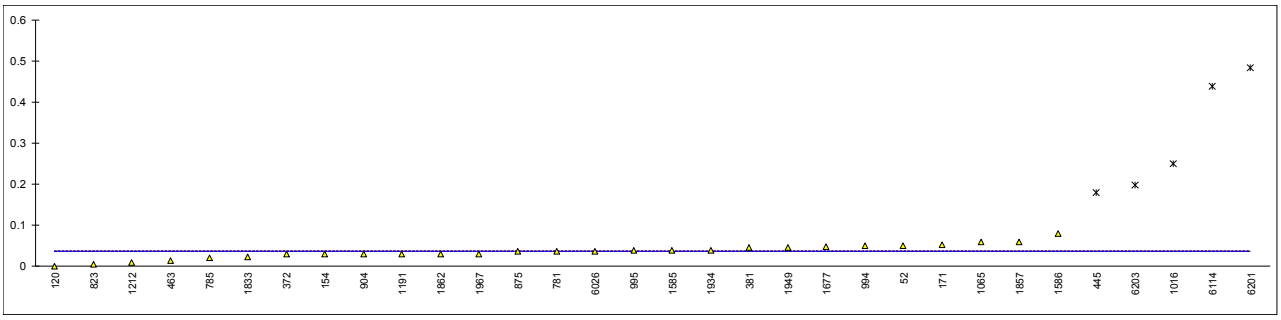


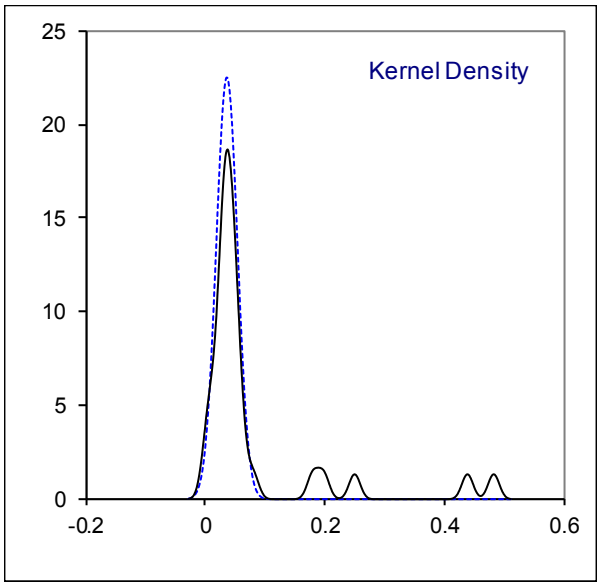


Determination of Asphaltenes on sample #18255; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	IP143	0.05		-----	
62		-----		-----	
120	D6560	0		-----	
131		-----		-----	
140		-----		-----	
150	IP143	<0.05	C	-----	first reported 0.15
154	IP143	0.03		-----	
158		-----		-----	
159		-----		-----	
171	IP143	0.052		-----	
225		-----		-----	
311		-----		-----	
313		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
356	IP143	<0.50		-----	
372	IP143	0.03		-----	
381	INH-642M	0.045		-----	
403		-----		-----	
445	IP143	0.18	R(0.01)	-----	
463	IP143	0.014		-----	
657	IP143	<0.50		-----	
663		-----		-----	
732		-----		-----	
750		-----		-----	
752		-----		-----	
781	IP143	0.037		-----	
785	IP143	0.02		-----	
798		-----		-----	
823	IP143	0.0053		-----	
874		-----		-----	
875	IP143	0.036		-----	
904	IP143	0.03		-----	
994	IP143	0.05		-----	
995	IP143	0.04		-----	
997		-----		-----	
1011	In house	< 0.50		-----	
1016	IP143	0.25	R(0.01)	-----	
1065	D6560	0.06		-----	
1108		-----		-----	
1134		-----		-----	
1191	INH-642	0.03		-----	
1212	IP143	0.0091		-----	
1229		-----		-----	
1379		-----		-----	
1397	D6560	<0,5		-----	
1543		-----		-----	
1556		-----		-----	
1585	IP143	0.04		-----	
1586	IP143	0.08		-----	
1613		-----		-----	
1635		-----		-----	
1677	INH-642	0.0476		-----	
1741		-----		-----	
1776		-----		-----	
1796		-----		-----	
1833	IP143	0.024		-----	
1857	IP143	0.06		-----	
1862	IP143	0.03		-----	
1934	INH-642	0.040		-----	
1949	IP143	0.046		-----	
1967	IP143	0.03		-----	
6024		-----		-----	
6025		-----		-----	
6026	D6560	0.0376		-----	
6057		-----		-----	
6114	IP143	0.439	R(0.01)	-----	
6201	IP143	0.483	R(0.01)	-----	
6203	IP143	0.198	C,R(0.01)	-----	first reported 0.35

normality	OK	
n	27	
outliers	5	
mean (n)	0.0361	
st.dev. (n)	0.01772	
R(calc.)	0.0496	
st.dev.(IP143:04)	(0.00258)	
R(IP143:04)	(0.0072)	Precision applicable between 0.50 – 30 %M/M
Compare		
R(iis17G07)	0.2186	at a mean of 0.2846

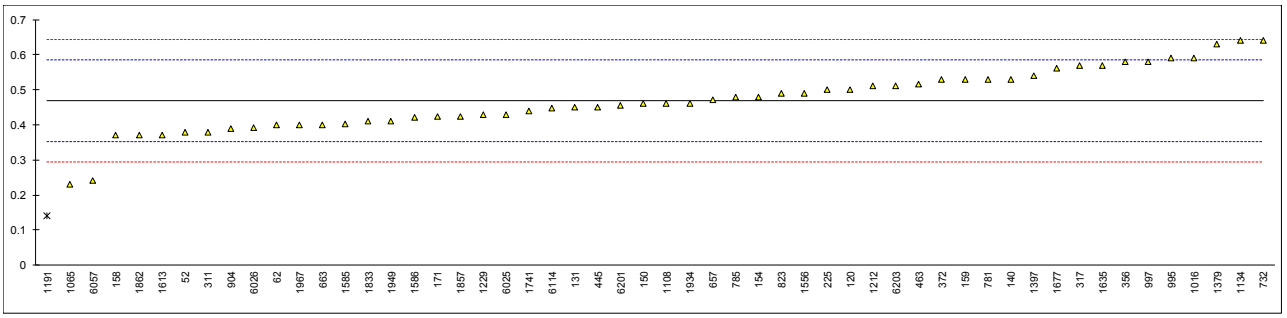


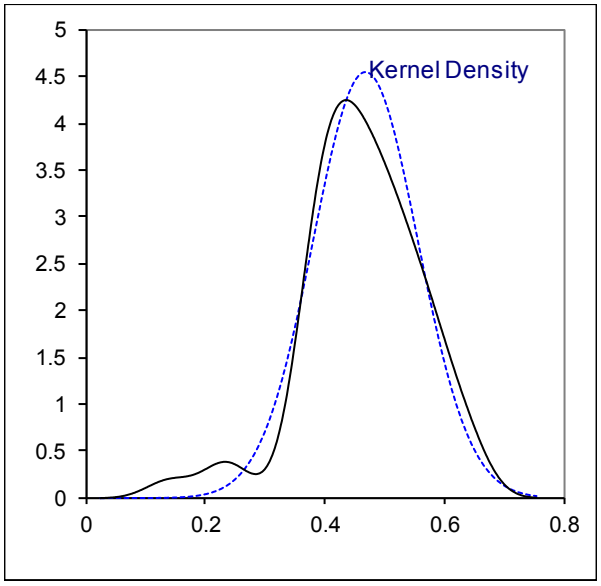


Determination of Carbon Residue, Micro method on sample #18255; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D4530	0.38		-1.53	
62	D4530	0.40		-1.19	
120	D4530	0.50		0.54	
131	D4530	0.45		-0.33	
140	D4530	0.53		1.05	
150	D4530	0.46		-0.15	
154	D4530	0.48		0.19	
158	D4530	0.37		-1.71	
159	D4530	0.53		1.05	
171	D4530	0.423		-0.79	
225	D4530	0.50		0.54	
311	D4530	0.38		-1.53	
313		-----		-----	
317	D4530	0.57		1.74	
323		-----		-----	
333		-----		-----	
334		-----		-----	
356	D4530	0.58		1.92	
372	D4530	0.53		1.05	
381		-----		-----	
403		-----		-----	
445	D4530	0.45		-0.33	
463	ISO10370	0.515		0.80	
657	D4530	0.47		0.02	
663	D4530	0.401		-1.17	
732	ISO10370	0.64		2.95	
750		-----		-----	
752		-----		-----	
781	D4530	0.53		1.05	
785	D4530	0.48		0.19	
798		-----		-----	
823	D4530	0.49		0.36	
874		-----		-----	
875		-----		-----	
904	D4530	0.39		-1.36	
994		-----		-----	
995	D4530	0.59		2.09	
997	D4530	0.58		1.92	
1011		-----		-----	
1016	ISO10370	0.59		2.09	
1065	D4530	0.23		-4.12	
1108	D4530	0.46		-0.15	
1134	D4530	0.639975		2.95	
1191	ISO10370	0.14	R(0.05)	-5.67	
1212	D4530	0.51		0.71	
1229	ISO10370	0.43		-0.67	
1379	GOST19922	0.63		2.78	
1397	D4530	0.54		1.23	
1543		-----		-----	
1556	ISO10370	0.49		0.36	
1585	D4530	0.402		-1.15	
1586	D4530	0.42		-0.84	
1613	D4530	0.3710		-1.69	
1635	D4530	0.57		1.74	
1677	D4530	0.56		1.57	
1741	ISO10370	0.44		-0.50	
1776		-----		-----	
1796		-----		-----	
1833	ISO10370	0.41		-1.02	
1857	D4530	0.423		-0.79	
1862	D4530	0.37		-1.71	
1934	D4530	0.46		-0.15	
1949	D4530	0.41		-1.02	
1967	D4530	0.40		-1.19	
6024		-----		-----	
6025	D4530	0.43		-0.67	
6026	D4530	0.3925		-1.32	
6057	D4530	0.24		-3.95	
6114	D4530	0.448		-0.36	
6201	D4530	0.456		-0.22	
6203	ISO10370	0.51		0.71	

normality	OK
n	53
outliers	1
mean (n)	0.4689
st.dev. (n)	0.08769
R(calc.)	0.2455
st.dev.(D4530:15)	0.05799
R(D4530:15)	0.1624

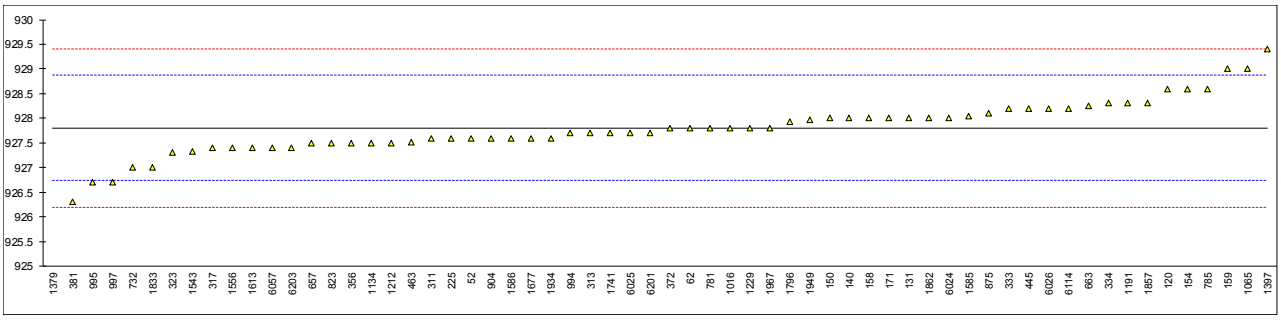


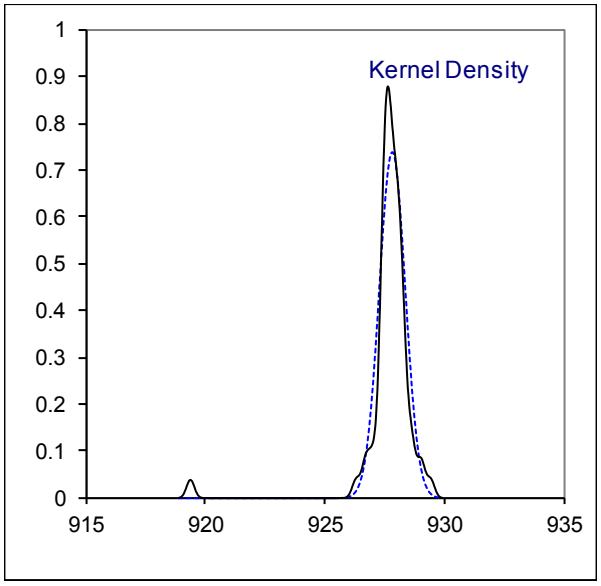


Determination of Density at 15°C on sample #18255; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
52	D4052	927.6		-0.38	
62	D4052	927.8		-0.01	
120	ISO12185	928.6		1.49	
131	D4052	928.0		0.37	
140	D4052	928.0		0.37	
150	D1298	928.0		0.37	
154	D4052	928.6		1.49	
158	D4052	928.0		0.37	
159	D4052	929.0		2.23	
171	ISO12185	928.0		0.37	
225	D4052	927.6		-0.38	
311	ISO12185	927.6		-0.38	
313	ISO12185	927.7		-0.19	
317	ISO12185	927.4		-0.75	
323	ISO12185	927.3		-0.94	
333	ISO12185	928.2		0.74	
334	ISO12185	928.3		0.93	
356	ISO12185	927.5		-0.57	
372	ISO12185	927.8		-0.01	
381	ISO12185	926.3		-2.81	
403		-----		-----	
445	D4052	928.2		0.74	
463	ISO12185	927.51		-0.55	
657	D4052	927.5		-0.57	
663	D4052	928.25		0.83	
732	ISO12185	927.0		-1.50	
750		-----		-----	
752		-----		-----	
781	ISO12185	927.8		-0.01	
785	D1298	928.6		1.49	
798		-----		-----	
823	ISO12185	927.5		-0.57	
874		-----		-----	
875	D1298	928.1		0.55	
904	D1298	927.6		-0.38	
994	ISO12185	927.7		-0.19	
995	ISO12185	926.7		-2.06	
997	ISO12185	926.7		-2.06	
1011	ISO12185	-----	W	-----	first reported 925.6
1016	ISO12185	927.8		-0.01	
1065	D4052	929.0		2.23	
1108		-----		-----	
1134	D4052	927.5		-0.57	
1191	ISO12185	928.3		0.93	
1212	ISO12185	927.5		-0.57	
1229	ISO12185	927.8		-0.01	
1379	D4052	919.4	R(0.01)	-15.69	
1397	ISO12185	929.4		2.98	
1543	D4052	927.32		-0.90	
1556	ISO12185	927.4		-0.75	
1585	ISO12185	928.05		0.46	
1586	D4052	927.6		-0.38	
1613	D4052	927.4		-0.75	
1635		-----		-----	
1677	D4052	927.6	C	-0.38	first reported 0.9276 kg/m^3
1741	ISO12185	927.7		-0.19	
1776		-----		-----	
1796	D4052	927.93		0.24	
1833	ISO12185	927		-1.50	
1857	ISO12185	928.3		0.93	
1862	ISO12185	928.0		0.37	
1934	ISO12185	927.6		-0.38	
1949	ISO12185	927.96		0.29	
1967	D1298	927.8		-0.01	
6024	D1298	928.0		0.37	
6025	D1298	927.7		-0.19	
6026	D1298	928.2		0.74	
6057	ISO12185	927.4		-0.75	
6114	ISO12185	928.2		0.74	
6201	ISO12185	927.7		-0.19	
6203	ISO12185	927.4	C	-0.75	first reported 929.4

normality	suspect
n	61
outliers	1
mean (n)	927.80
st.dev. (n)	0.540
R(calc.)	1.51
st.dev.(ISO12185:96)	0.536
R(ISO12185:96)	1.5

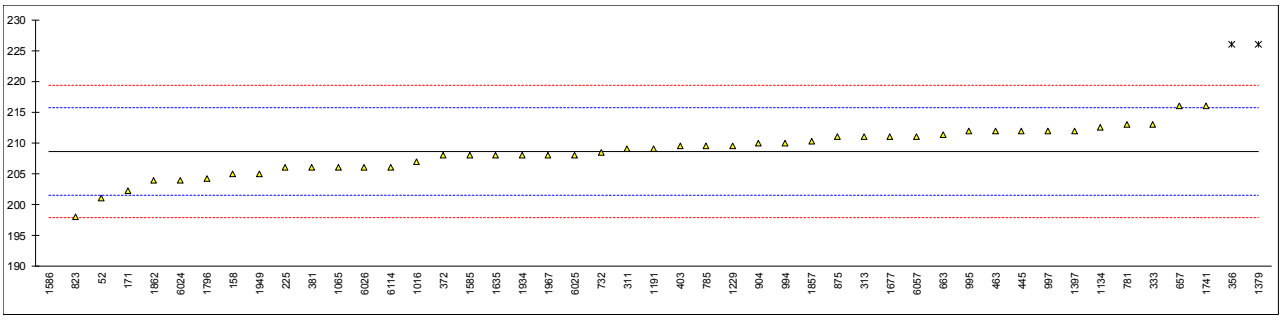


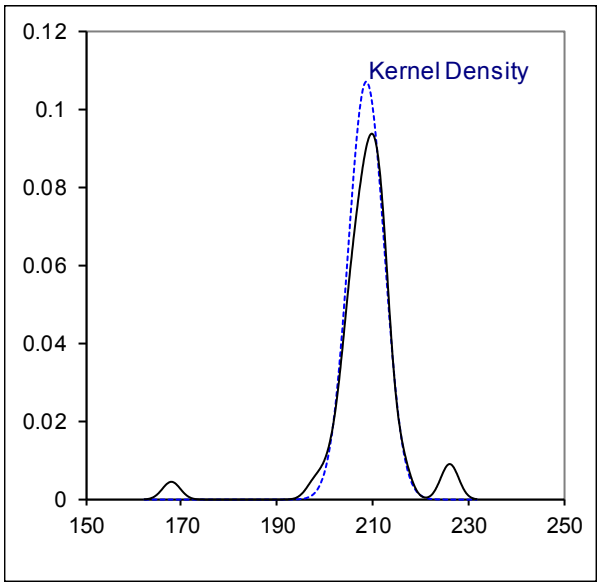


Determination of Flash Point PMcc on sample #18255; results in °C

lab	method	value	mark	z(targ)	remarks
52	D93-B	201.0		-2.14	
62		-----		-----	
120	D93-B	>110		-----	
131		-----		-----	
140	D93-B	>110		-----	
150	D93-B	>110.0		-----	
154	D93-B	>121.0		-----	
158	D93-B	205		-1.02	
159		-----		-----	
171	D93-B	202.2		-1.80	
225	D93-B	206.0		-0.74	
311	D93-B	209.0		0.11	
313	D93-B	211.0		0.67	
317		-----		-----	
323		-----		-----	
333	D93-B	213.0		1.23	
334		-----		-----	
356	D93-B	226.0	R(0.01)	4.87	
372	D93-B	208.0		-0.18	
381	ISO2719	206		-0.74	
403	ISO2719	209.5		0.25	
445	D93-A	212.0		0.95	
463	D93-B	212.0		0.95	
657	D93-B	216	C	2.07	first reported 226
663	D93-B	211.35		0.76	
732	ISO2719	208.5		-0.04	
750		-----		-----	
752		-----		-----	
781	D93-B	213.0		1.23	
785	D93-B	209.5		0.25	
798		-----		-----	
823	D93-B	198.0		-2.98	
874		-----		-----	
875	D93-B	211.0		0.67	
904	D93-B	210		0.39	
994	D93-B	210.0		0.39	
995	D93-B	212.0		0.95	
997	D93-B	212.0		0.95	
1011	ISO2719	-----	W	-----	first reported 190
1016		207.0		-0.46	
1065	D93-A	206		-0.74	
1108		-----		-----	
1134	D93-B	212.5		1.09	
1191	ISO2719	209.0		0.11	
1212		-----		-----	
1229	ISO2719	209.5		0.25	
1379	D93-B	226	R(0.01)	4.87	
1397	D93-B	212.0		0.95	
1543		-----		-----	
1556	ISO2719	<110		<-27.62	possibly a false negative test result?
1585	D93-B	208.0		-0.18	
1586	D93-B	168.0	C,R(0.01)	-11.38	first reported 164
1613	D93-B	>150	C	-----	first reported 84.5
1635	D93-B	208		-0.18	
1677	D93-A	211.0		0.67	
1741	ISO2719	216		2.07	
1776		-----		-----	
1796	D93-B	204.2		-1.24	
1833		-----		-----	
1857	D93-A	210.25		0.46	
1862	D93-B	204.0		-1.30	
1934	D93-B	208.0		-0.18	
1949	D93-B	205.0		-1.02	
1967	D93-B	208.0		-0.18	
6024	D93-B	204.0		-1.30	
6025	D93-B	208.0		-0.18	
6026	D93-B	206		-0.74	
6057	D93-B	211.0		0.67	
6114	D93-B	206.0		-0.74	
6201	D93-B	>270		>17.19	possibly a false positive test result?
6203		-----		-----	

normality	OK
n	44
outliers	3
mean (n)	208.63
st.dev. (n)	3.731
R(calc.)	10.45
st.dev.(D93-B:18)	3.571
R(D93-B:18)	10

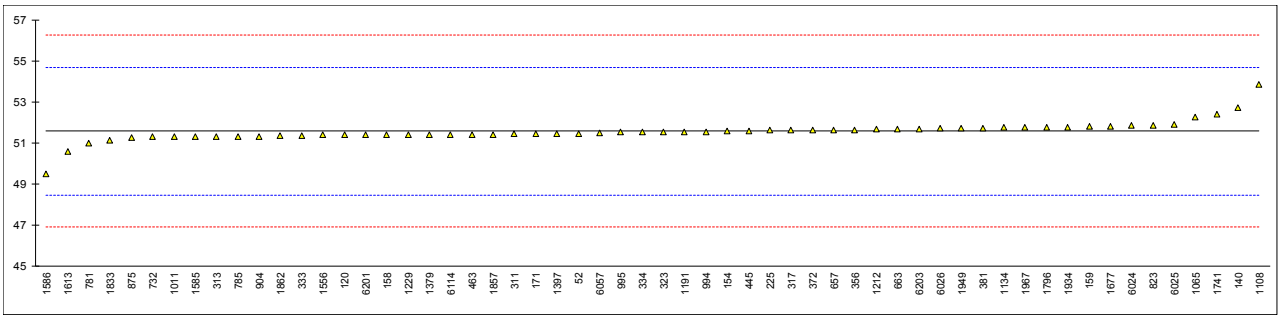


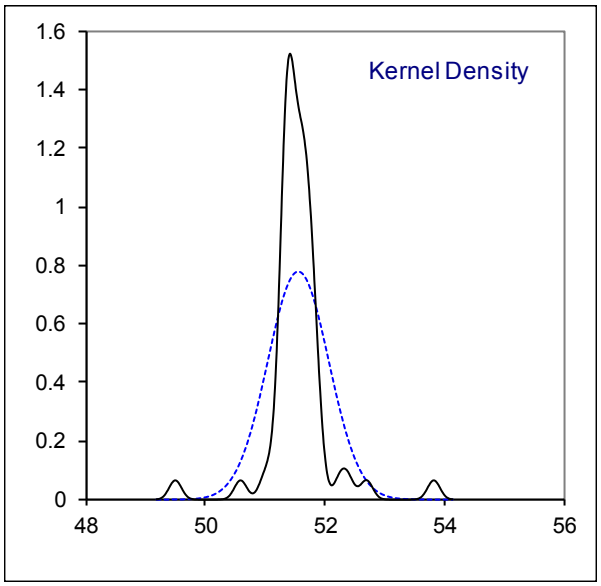


Determination of Kinematic Viscosity at 50°C on sample #18255; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
52	D445	51.46		-0.07	
62		-----		-----	
120	D445	51.38		-0.12	
131		-----		-----	
140	D445	52.71		0.73	
150		-----		-----	
154	D445	51.57		0.00	
158	D445	51.4		-0.11	
159	D445	51.82		0.16	
171	D445	51.4356		-0.08	
225	D445	51.62		0.04	
311	D445	51.43		-0.09	
313	D445	51.33		-0.15	
317	D445	51.63		0.04	
323	D445	51.54		-0.02	
333	D445	51.37		-0.13	
334	D445	51.53		-0.02	
356	D445	51.65		0.05	
372	D445	51.63		0.04	
381	ISO3104	51.74	C	0.11	first reported 8.800
403		-----		-----	
445	D445	51.60		0.02	
463	D445	51.415		-0.10	
657	D445	51.65		0.05	
663	D445	51.667		0.07	
732	D445	51.29		-0.18	
750		-----		-----	
752		-----		-----	
781	D445	51.00		-0.36	
785	D445	51.33		-0.15	
798		-----		-----	
823	D445	51.87		0.20	
874		-----		-----	
875	D445	51.27		-0.19	
904	D445	51.33		-0.15	
994	D445	51.55		-0.01	
995	D445	51.52		-0.03	
997		-----		-----	
1011	ISO3104	51.29		-0.18	
1016		-----		-----	
1065	D445	52.264		0.45	
1108	D445	53.84		1.46	
1134	D445	51.75		0.12	
1191	ISO3104	51.545		-0.01	
1212	D7042	51.656		0.06	
1229	ISO3104	51.41		-0.10	
1379	D445	51.41		-0.10	
1397	D7042	51.44		-0.08	
1543		-----		-----	
1556	ISO3104	51.379		-0.12	
1585	D445	51.319		-0.16	
1586	D445	49.50		-1.33	
1613	D445	50.596		-0.62	
1635		-----		-----	
1677	D445	51.83		0.17	
1741	ISO3104	52.40		0.54	
1776		-----		-----	
1796	D445	51.775		0.13	
1833	D445	51.135		-0.28	
1857	D445	51.415		-0.10	
1862	D445	51.34		-0.14	
1934	D445	51.782		0.14	
1949	D445	51.73		0.11	
1967	D445	51.7633		0.13	
6024	D445	51.86		0.19	
6025	D445	51.92		0.23	
6026	D445	51.7034		0.09	
6057	D445	51.50		-0.04	
6114	D445	51.413		-0.10	
6201	D445	51.39		-0.11	
6203	D7042	51.672		0.07	

normality	not OK
n	58
outliers	0
mean (n)	51.5649
st.dev. (n)	0.51276
R(calc.)	1.4357
st.dev.(D445:18)	1.55818
R(D445:18)	4.3629

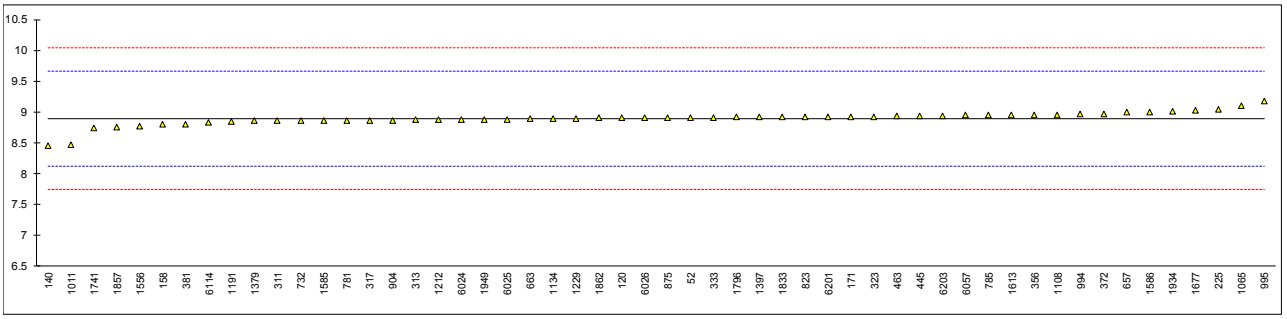


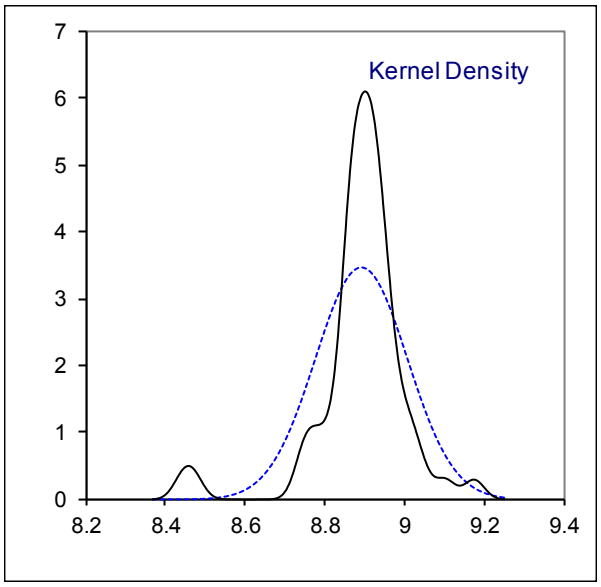


Determination of Kinematic Viscosity at 100°C on sample #18255; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
52	D445	8.908		0.04	
62		-----		-----	
120	D445	8.900		0.02	
131		-----		-----	
140	D445	8.446		-1.17	
150		-----		-----	
154		-----		-----	
158	D445	8.793		-0.26	
159		-----		-----	
171	D445	8.9244		0.08	
225	D445	9.044		0.39	
311	D445	8.861		-0.08	
313	D445	8.869		-0.06	
317	D445	8.8646		-0.07	
323	D445	8.926		0.09	
333	D445	8.913		0.05	
334		-----		-----	
356	D445	8.956		0.16	
372	D445	8.967		0.19	
381	ISO3104	8.800	C	-0.24	first reported 51.74
403		-----		-----	
445	D445	8.935		0.11	
463	D445	8.9299		0.10	
657	D445	8.989		0.25	
663	D445	8.8866		-0.02	
732	D445	8.862		-0.08	
750		-----		-----	
752		-----		-----	
781	D445	8.864		-0.08	
785	D445	8.949		0.15	
798		-----		-----	
823	D445	8.922		0.07	
874		-----		-----	
875	D445	8.906		0.03	
904	D445	8.865		-0.07	
994	D445	8.964		0.18	
995	D445	9.176		0.74	
997		-----		-----	
1011	ISO3104	8.474		-1.09	
1016		-----		-----	
1065	D445	9.103		0.55	
1108	D445	8.957		0.17	
1134	D445	8.889		-0.01	
1191	ISO3104	8.8378		-0.14	
1212	D7042	8.8721		-0.06	
1229	ISO3104	8.89		-0.01	
1379	D445	8.855		-0.10	
1397	D7042	8.917		0.06	
1543		-----		-----	
1556	D341	8.764		-0.34	
1585	D445	8.8628		-0.08	
1586	D445	8.999		0.28	
1613	D445	8.9557		0.16	
1635		-----		-----	
1677	D445	9.023		0.34	
1741	ISO3104	8.743		-0.39	
1776		-----		-----	
1796	D445	8.9162		0.06	
1833	D445	8.919		0.07	
1857	D445	8.759		-0.35	
1862	D445	8.899		0.01	
1934	D445	9.0128		0.31	
1949	D445	8.878		-0.04	
1967		-----		-----	
6024	D445	8.876		-0.05	
6025	D445	8.883		-0.03	
6026	D445	8.901		0.02	
6057	D445	8.947		0.14	
6114	D445	8.8259		-0.18	
6201	D445	8.923		0.08	
6203	D7042	8.935		0.11	

normality	not OK
n	54
outliers	0
mean (n)	8.8933
st.dev. (n)	0.11540
R(calc.)	0.3231
st.dev.(D445:18)	0.38305
R(D445:18)	1.0725

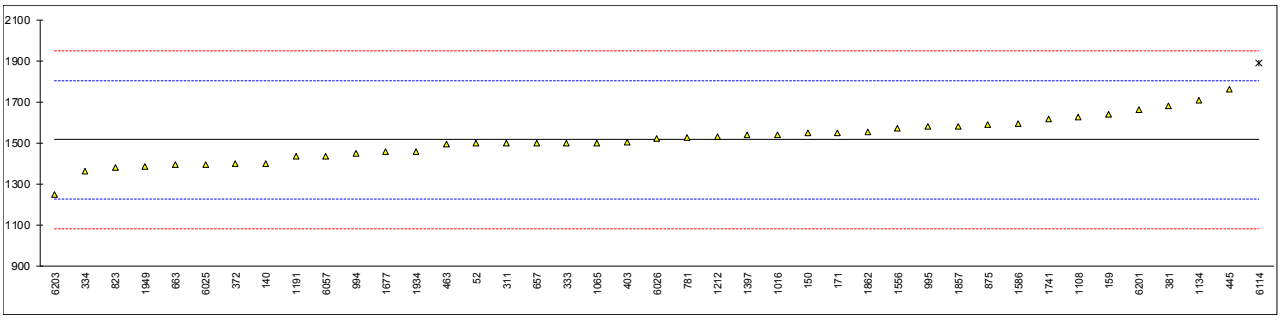


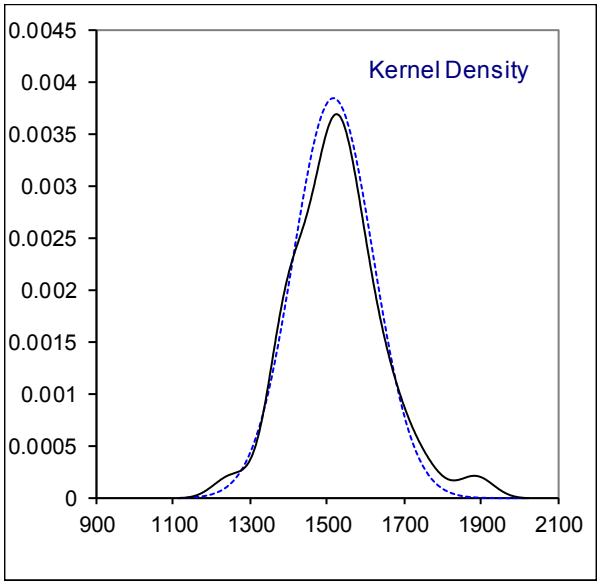


Determination of Nitrogen on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	Remarks
52	D4629	1500		-0.11	
62		-----		-----	
120		-----		-----	
131		-----		-----	
140	D5762 Gravimetric	1400		-0.80	
150	D5762 Volumetric	1547		0.22	
154		-----		-----	
158		-----		-----	
159	D4629	1639.7		0.86	
171	D5762 Volumetric	1549		0.23	
225		-----		-----	
311	D5762 Volumetric	1500		-0.11	
313		-----		-----	
317		-----		-----	
323		-----		-----	
333	D5762 Volumetric	1500		-0.11	
334	D5762 Volumetric	1365		-1.05	
356		-----		-----	
372	D5762 Volumetric	1400		-0.80	
381	D4629	1680		1.14	
403	D5762 Gravimetric	1505.60		-0.07	
445	D5762 Gravimetric	1760		1.70	
463	D5762 Gravimetric	1497		-0.13	
657	D5762 Gravimetric	1500		-0.11	
663	D5762 Volumetric	1393		-0.85	
732		-----		-----	
750		-----		-----	
752		-----		-----	
781	D3228	1525		0.06	
785		-----		-----	
798		-----		-----	
823	D5762 Volumetric	1380		-0.94	
874		-----		-----	
875	D5762 Gravimetric	1592		0.53	
904		-----		-----	
994	D5762	1450		-0.46	
995		1580		0.45	
997		-----		-----	
1011		-----		-----	
1016	D5762 Gravimetric	1542		0.18	
1065	D5291-D	1500		-0.11	
1108	D5762 Gravimetric	1627		0.77	
1134	D5762 Volumetric	1707.552		1.33	
1191	D5762 Volumetric	1436		-0.55	
1212	D5762 Gravimetric	1530		0.10	
1229		-----		-----	
1379		-----		-----	
1397	In house	1540		0.17	
1543		-----		-----	
1556	D5762 Volumetric	1574		0.40	
1585		-----		-----	
1586	D5762 Volumetric	1593		0.54	
1613		-----		-----	
1635		-----		-----	
1677	D5762 Gravimetric	1458		-0.40	
1741	D5762 Gravimetric	1616		0.70	
1776		-----		-----	
1796		-----		-----	
1833		-----		-----	
1857	D5762 Gravimetric	1582		0.46	
1862	D5762 Volumetric	1552		0.25	
1934	D5762 Gravimetric	1460		-0.39	
1949	D5762 Volumetric	1385		-0.91	
1967		-----		-----	
6024		-----		-----	
6025	D5762 Volumetric	1396		-0.83	
6026	D5762 Gravimetric	1523		0.05	
6057	D5762 Gravimetric	1436		-0.55	
6114	D5762 Gravimetric	1887	R(0.05)	2.58	
6201	D5762 Gravimetric	1664		1.03	
6203	D5762 Gravimetric	1250		-1.85	

		D5762-Volumetric	D5762-Gravimetric
normality	OK	OK	suspect
n	40	15	17
outliers	1	0	1
mean (n)	1515.87	1485.17	1526.04
st.dev. (n)	104.041	101.217	114.820
R(calc.)	291.31	283.41	321.50
st.dev.(D5762:18a)	144.008	144.008	144.008
R(D5762:18a)	403.22	395.06	405.93

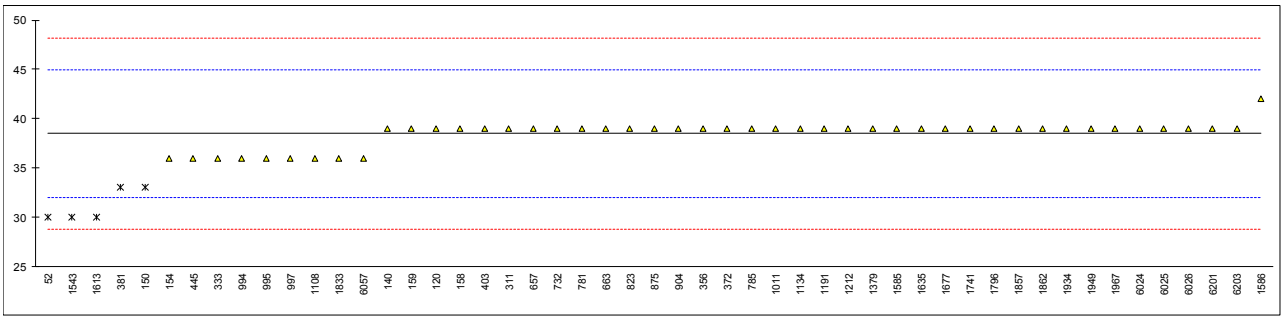


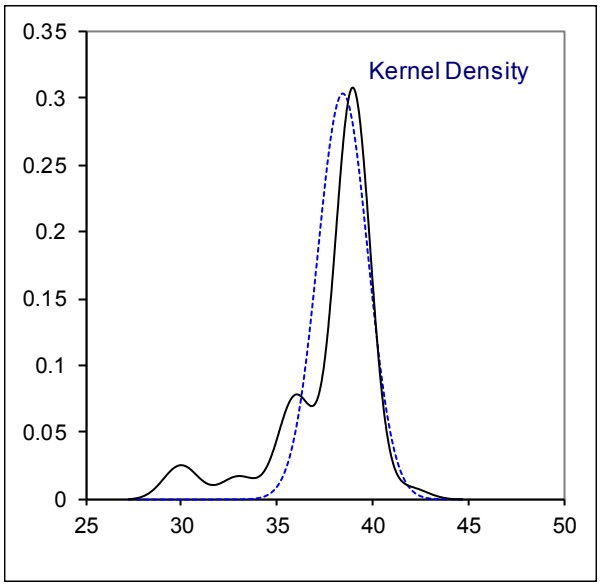


Determination of Pour Point, manual on sample #18255; results in °C

lab	method	value	mark	z(targ)	remarks
52	D97	30	R(0.01)	-2.64	
62		-----		-----	
120	D97	39		0.16	
131		-----		-----	
140	D97	39		0.16	
150	D97	33	R(0.01)	-1.70	
154	D97	36.0		-0.77	
158	D97	39		0.16	
159	D97	39		0.16	
171		-----		-----	
225		-----		-----	
311	D97	39		0.16	
313		-----		-----	
317		-----		-----	
323		-----		-----	
333	D97	36		-0.77	
334		-----		-----	
356	D97	39		0.16	
372	D97	39		0.16	
381	ISO3016	33	R(0.01)	-1.70	
403	D97	39		0.16	
445	D97	36		-0.77	
463		-----		-----	
657	D97	39		0.16	
663	D97	39		0.16	
732	D97	39		0.16	
750		-----		-----	
752		-----		-----	
781	D97	39		0.16	
785	D97	39		0.16	
798		-----		-----	
823	D97	39		0.16	
874		-----		-----	
875	D97	39		0.16	
904	D97	39		0.16	
994	D97	36		-0.77	
995	D97	36		-0.77	
997	D97	36		-0.77	
1011	D97	39		0.16	
1016		-----		-----	
1065		-----		-----	
1108	D97	36		-0.77	
1134	D97	39		0.16	
1191	ISO3016	39		0.16	
1212	D97	39		0.16	
1229		-----		-----	
1379	D97	39		0.16	
1397		-----		-----	
1543	D97	30	R(0.01)	-2.64	
1556		-----		-----	
1585	D97	39		0.16	
1586	D97	42		1.10	
1613	D97	30	R(0.01)	-2.64	
1635	D97	39		0.16	
1677	D97	39		0.16	
1741	ISO3016	39		0.16	
1776		-----		-----	
1796	D97	39		0.16	
1833	D97	36		-0.77	
1857	D97	39		0.16	
1862	D97	39		0.16	
1934	D97	39		0.16	
1949	D97	39		0.16	
1967	D97	39		0.16	
6024	D97	39		0.16	
6025	D97	39		0.16	
6026	D97	39		0.16	
6057	D97	36		-0.77	
6114		-----		-----	
6201	D97	39		0.16	
6203	D97	39		0.16	

normality	suspect
n	46
outliers	5
mean (n)	38.478
st.dev. (n)	1.3122
R(calc.)	3.674
st.dev.(D97:17b)	3.2143
R(D97:17b)	9

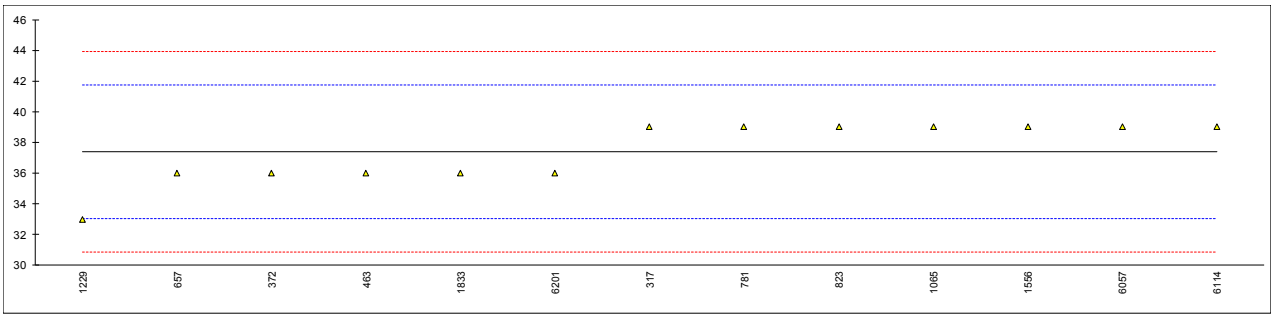


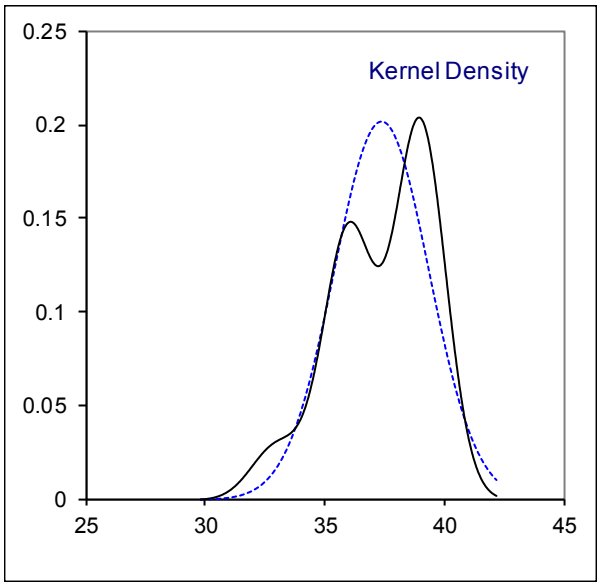


Determination of Pour Point, automated, 3°C interval on sample #18255; results in °C

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120		-----		-----	
131		-----		-----	
140		-----		-----	
150		-----		-----	
154		-----		-----	
158		-----		-----	
159		-----		-----	
171		-----		-----	
225		-----		-----	
311		-----		-----	
313		-----		-----	
317	D5771	39		0.74	
323		-----		-----	
333		-----		-----	
334		-----		-----	
356		-----		-----	
372	D5950	36		-0.64	
381		-----		-----	
403		-----		-----	
445		-----		-----	
463	D6892	36		-0.64	
657	D5950	36		-0.64	
663		-----		-----	
732		-----		-----	
750		-----		-----	
752		-----		-----	
781	D5950	39		0.74	
785		-----		-----	
798		-----		-----	
823	D5950	39		0.74	
874		-----		-----	
875		-----		-----	
904		-----		-----	
994		-----		-----	
995		-----		-----	
997		-----		-----	
1011		-----		-----	
1016		-----		-----	
1065	D5950	39		0.74	
1108		-----		-----	
1134		-----		-----	
1191		-----		-----	
1212		-----		-----	
1229	ISO3016	33		-2.01	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556	ISO3016	39		0.74	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635		-----		-----	
1677		-----		-----	
1741		-----		-----	
1776		-----		-----	
1796		-----		-----	
1833	D5950	36		-0.64	
1857		-----		-----	
1862		-----		-----	
1934		-----		-----	
1949		-----		-----	
1967		-----		-----	
6024		-----		-----	
6025		-----		-----	
6026		-----		-----	
6057	D5950	39		0.74	
6114	D5950	39		0.74	
6201	D5950	36		-0.64	
6203		-----		-----	

normality	OK
n	13
outliers	0
mean (n)	37.385
st.dev. (n)	1.9807
R(calc.)	5.546
st.dev.(D5950:14)	2.1786
R(D5950:14)	6.1

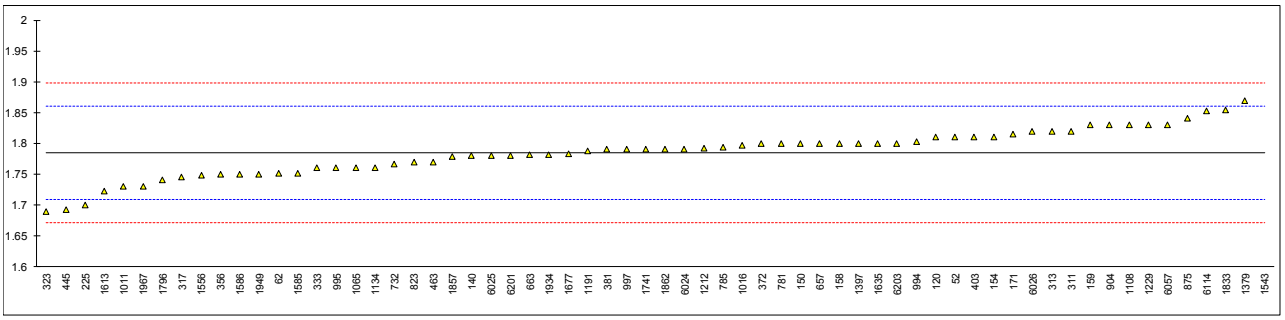


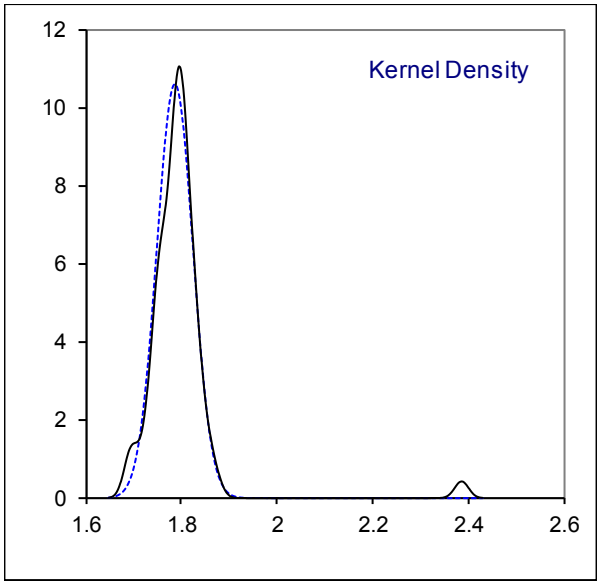


Determination of Sulphur Total on sample #18255; results in %M/M

lab	method	value	mark	z(targ)	remarks
52	D4294	1.81		0.66	
62	D4294	1.7510		-0.91	
120	ISO8754	1.81		0.66	
131		-----		-----	
140	D4294	1.78		-0.14	
150	D4294	1.80	C	0.39	first reported 1.62
154	D4294	1.81		0.66	
158	D4294	1.80		0.39	
159	D4294	1.8295		1.18	
171	D4294	1.8155		0.80	
225	D4294	1.70		-2.26	
311	D4294	1.82		0.92	
313	D4294	1.82		0.92	
317	D2622	1.746		-1.04	
323	D2622	1.69		-2.52	
333	D4294	1.76		-0.67	
334		-----		-----	
356	D4294	1.75		-0.93	
372	D4294	1.80		0.39	
381	ISO8754	1.79		0.13	
403	D4294	1.81		0.66	
445	D4294	1.693		-2.44	
463	D4294	1.77		-0.40	
657	D4294	1.80		0.39	
663	D4294	1.781		-0.11	
732	D4294	1.766		-0.51	
750		-----		-----	
752		-----		-----	
781	D4294	1.80		0.39	
785	D4294	1.794		0.23	
798		-----		-----	
823	D4294	1.77		-0.40	
874		-----		-----	
875	D4294	1.84		1.45	
904	D4294	1.83	C	1.19	first reported 1.93
994	D4294	1.803		0.47	
995	D4294	1.76		-0.67	
997	D4294	1.79		0.13	
1011	ISO8754	1.73		-1.46	
1016		1.796		0.29	
1065	D4294	1.76		-0.67	
1108	D4294	1.83		1.19	
1134	D4294	1.76		-0.67	
1191	ISO8754	1.788		0.08	
1212	D4294	1.792		0.18	
1229	ISO8754	1.83		1.19	
1379	D4294	1.870		2.25	
1397	D2622	1.80		0.39	
1543	D4294	2.3853	R(0.01)	15.92	
1556	ISO8754	1.748		-0.99	
1585	D4294	1.751		-0.91	
1586	D4294	1.75		-0.93	
1613	D4294	1.722		-1.68	
1635	D4294	1.80		0.39	
1677	D4294	1.783		-0.06	
1741	ISO8754/D2622	1.79		0.13	
1776		-----		-----	
1796	D4294	1.741		-1.17	
1833	ISO8754	1.854		1.83	
1857	D4294	1.779		-0.16	
1862	D4294	1.79		0.13	
1934	D4294	1.781		-0.11	
1949	D4294	1.75		-0.93	
1967	D4294	1.73		-1.46	
6024	D4294	1.79		0.13	
6025	D4294	1.78		-0.14	
6026	D4294	1.819		0.90	
6057	D4294	1.83		1.19	
6114	D4294	1.852		1.77	
6201	D4294	1.78		-0.14	
6203	D2622	1.8		0.39	

normality	OK
n	63
outliers	1
mean (n)	1.7852
st.dev. (n)	0.03770
R(calc.)	0.1056
st.dev.(D4294:16e1)	0.03770
R(D4294:16e1)	0.1056



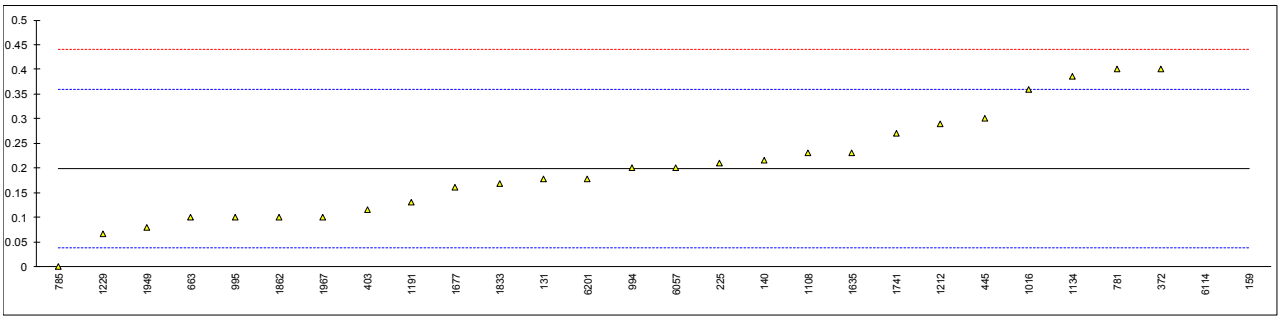


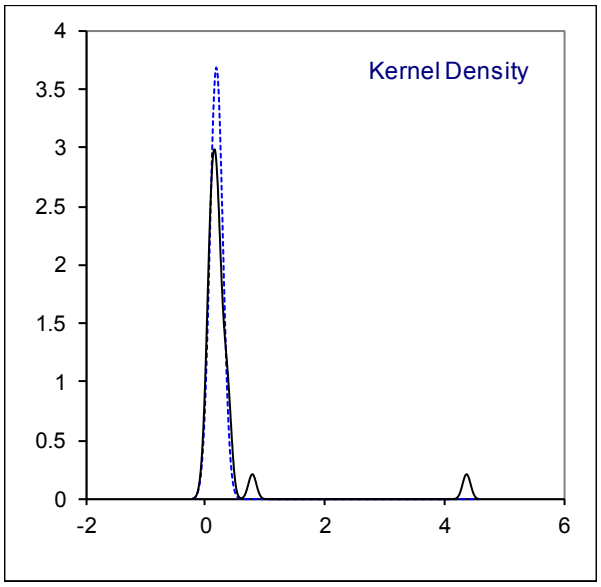
Determination of Calcium as Ca on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP470	<3		-----	
62		-----		-----	
120		-----		-----	
131	IP501	0.177		-0.27	
140	D5708	0.215		0.20	
150	IP501	<3		-----	
154		-----		-----	
158		-----		-----	
159	D5708	4.38	R(0.01)	51.99	
171	D5708	<1		-----	
225	IP501	0.21		0.14	
311		-----		-----	
313		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
334		-----		-----	
356		-----		-----	
372	IP470	0.4		2.50	
381		-----		-----	
403	IP621	0.115		-1.04	
445	IP621	0.3		1.26	
463		-----		-----	
657	IP501	<3		-----	
663	IP501	0.1		-1.23	
732		-----		-----	
750		-----		-----	
752		-----		-----	
781	IP621	0.4		2.50	
785	IP470	0		-2.47	
798		-----		-----	
823		-----		-----	
874		-----		-----	
875		-----		-----	
904		-----		-----	
994	IP501	0.2		0.02	
995	IP470	0.1		-1.23	
997		-----		-----	
1011		-----		-----	
1016	NEN6966	0.359		1.99	
1065		-----		-----	
1108	D7111	0.23		0.39	
1134	IP621	0.385		2.32	
1191	D5185	0.13		-0.85	
1212	IP621	0.29		1.14	
1229	In house	0.066		-1.65	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556		-----		-----	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635	D5185	0.23		0.39	
1677	IP621	0.16		-0.48	
1741	UOP407	0.27		0.89	
1776		-----		-----	
1796		-----		-----	
1833	IP501	0.168		-0.38	
1857	IP501	<0.5		-----	
1862	IP621	0.1		-1.23	
1934	IP501	< 0.1		-----	
1949	IP621	0.08		-1.47	
1967	IP501	0.1		-1.23	
6024		-----		-----	
6025		-----		-----	
6026		-----		-----	
6057	IP621	0.2		0.02	
6114	IP501	0.8	R(0.01)	7.48	
6201	IP501	0.178		-0.26	
6203		-----		-----	

normality	OK
n	26
outliers	2
mean (n)	0.199
st.dev. (n)	0.1082
R(calc.)	0.303
st.dev.(IP501:05)	0.0804
R(IP501:05)	0.225

Application range: 3 – 100 mg/kg



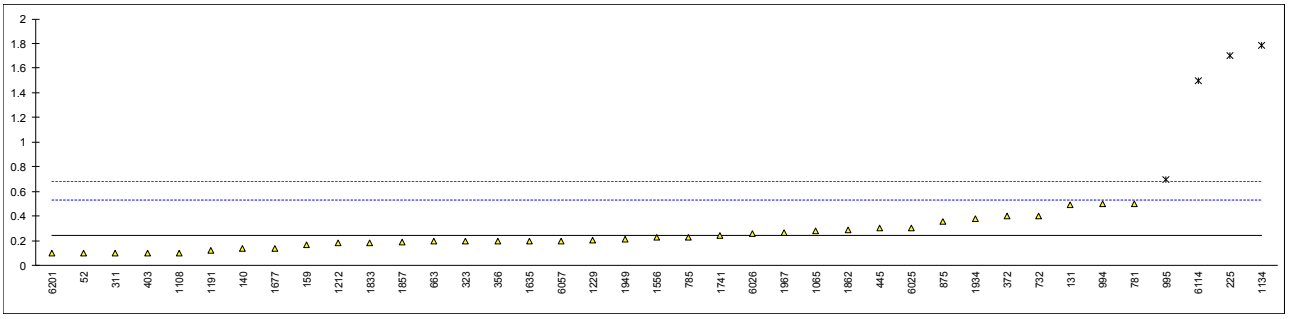


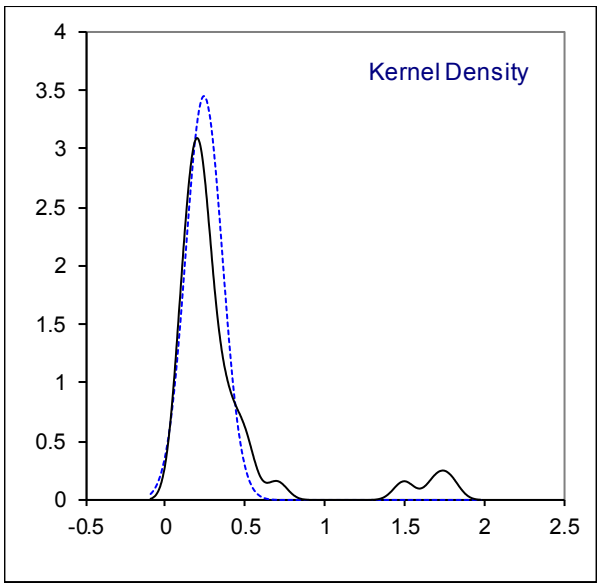
Determination of Iron as Fe on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP621	0.1		-0.97	
62		-----		-----	
120		-----		-----	
131	IP501	0.496		1.75	
140	D5708	0.134		-0.74	
150	IP501	<2		-----	
154		-----		-----	
158		-----		-----	
159	D5708	0.17		-0.49	
171	D5708	<1		-----	
225	IP501	1.70	R(0.01)	10.02	
311	IP621	0.1		-0.97	
313		-----		-----	
317		-----		-----	
323	IP621	0.2		-0.29	
333		-----		-----	
334		-----		-----	
356	IP621	0.2		-0.29	
372	IP621	0.4		1.09	
381		-----		-----	
403	IP621	0.1		-0.97	
445	IP621	0.3		0.40	
463		-----		-----	
657	IP501	<2	C	-----	first reported 3
663	IP501	0.2		-0.29	
732	IP501	0.4		1.09	
750		-----		-----	
752		-----		-----	
781	IP621	0.5		1.78	
785	IP470	0.23		-0.08	
798		-----		-----	
823		-----		-----	
874		-----		-----	
875	IP621	0.36		0.81	
904		-----		-----	
994	IP501	0.5		1.78	
995	IP621	0.7	R(0.05)	3.15	
997		-----		-----	
1011		-----		-----	
1016	In house	<2		-----	
1065	UOP389	0.28		0.26	
1108	D7111	0.10		-0.97	
1134	IP621	1.788	R(0.01)	10.63	
1191	D5185	0.12		-0.84	
1212	IP621	0.18		-0.42	
1229	In house	0.204		-0.26	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556	IP621	0.227		-0.10	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635	D5185	0.2		-0.29	
1677	IP621	0.14		-0.70	
1741	UOP407	0.24		-0.01	
1776		-----		-----	
1796		-----		-----	
1833	IP501	0.185		-0.39	
1857	IP621	0.19		-0.35	
1862	IP621	0.29		0.33	
1934	IP621	0.38		0.95	
1949	IP621	0.21		-0.22	
1967	IP501	0.263		0.15	
6024		-----		-----	
6025	IP470	0.3		0.40	
6026	IP PM CW	0.2568		0.10	
6057	IP621	0.2		-0.29	
6114	IP501	1.5	R(0.01)	8.65	
6201	IP621	0.099		-0.98	
6203		-----		-----	

normality	OK
n	35
outliers	4
mean (n)	0.242
st.dev. (n)	0.1159
R(calc.)	0.324
st.dev.(IP621:16)	0.1455
R(IP621:16)	0.407

Application range: 0.7 – 8.5 mg/kg



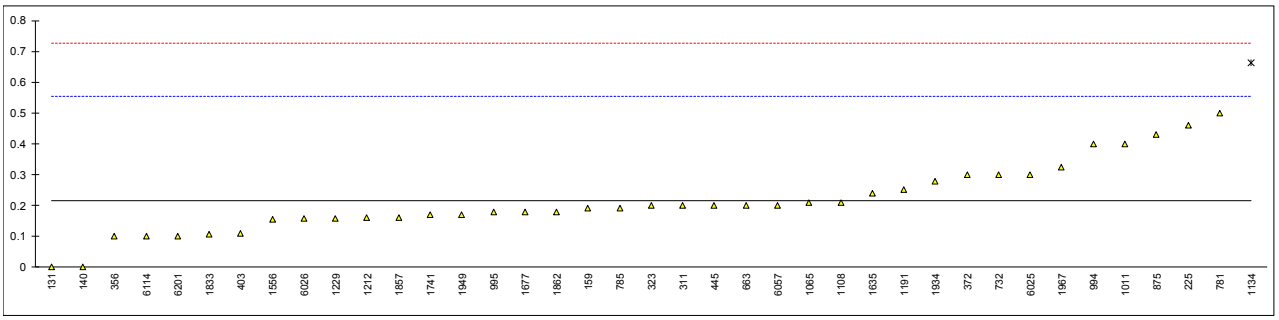


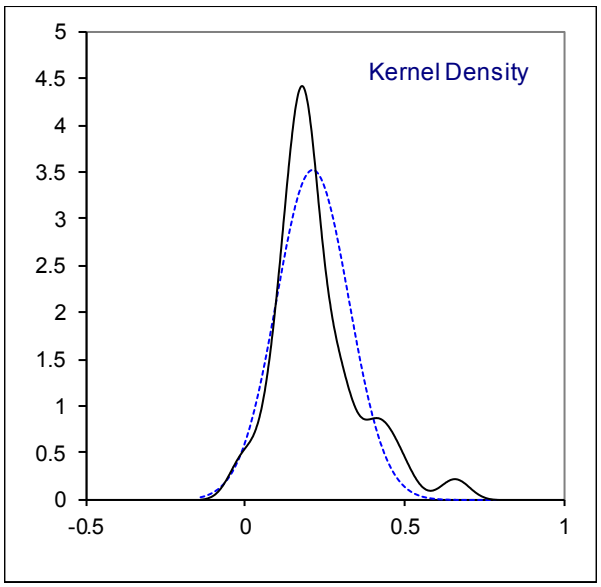
Determination of Nickel as Ni on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP621	<0.1		-----	
62		-----		-----	
120		-----		-----	
131	IP501	0		-1.27	
140	D5708	0		-1.27	
150	IP501	<1		-----	
154		-----		-----	
158		-----		-----	
159	D5708	0.19		-0.15	
171	D5708	<1		-----	
225	IP501	0.46		1.44	
311	IP621	0.2		-0.09	
313		-----		-----	
317		-----		-----	
323	IP621	0.2		-0.09	
333		-----		-----	
334		-----		-----	
356	IP621	0.1		-0.68	
372	IP621	0.3		0.50	
381		-----		-----	
403	IP621	0.11		-0.62	
445	IP621	0.2		-0.09	
463		-----		-----	
657	IP501	<1		-----	
663	IP501	0.2		-0.09	
732	IP501	0.3		0.50	
750		-----		-----	
752		-----		-----	
781	IP621	0.5		1.68	
785	IP470	0.19		-0.15	
798		-----		-----	
823		-----		-----	
874		-----		-----	
875	IP621	0.43		1.27	
904		-----		-----	
994	IP501	0.4		1.09	
995	IP621	0.18		-0.21	
997		-----		-----	
1011	In house	0.4		1.09	
1016	In house	<2		-----	
1065	UOP389	0.21		-0.03	
1108	D7111	0.21		-0.03	
1134	IP621	0.661	R(0.05)	2.63	
1191	D5185	0.25		0.21	
1212	IP621	0.16		-0.32	
1229	In house	0.159		-0.33	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556	IP621	0.156		-0.35	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635	D5185	0.24		0.15	
1677	IP621	0.18		-0.21	
1741	UOP407	0.17		-0.27	
1776		-----		-----	
1796		-----		-----	
1833	IP501	0.106		-0.64	
1857	IP621	0.16		-0.32	
1862	IP621	0.18		-0.21	
1934	IP621	0.28		0.38	
1949	IP621	0.17		-0.27	
1967	IP501	0.324		0.64	
6024		-----		-----	
6025	IP470	0.3		0.50	
6026	IP PM CW	0.1582		-0.34	
6057	IP621	0.2		-0.09	
6114	IP501	0.1		-0.68	
6201	IP621	0.101		-0.67	
6203		-----		-----	

normality	OK
n	38
outliers	1
mean (n)	0.215
st.dev. (n)	0.1135
R(calc.)	0.318
st.dev.(IP621:16)	0.1699
R(IP621:16)	0.476

Application range: 0.2 – 11.5 mg/kg



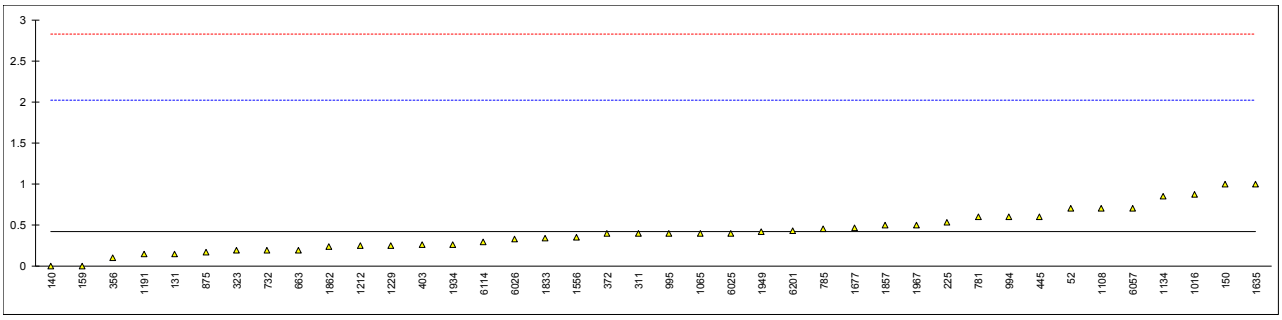


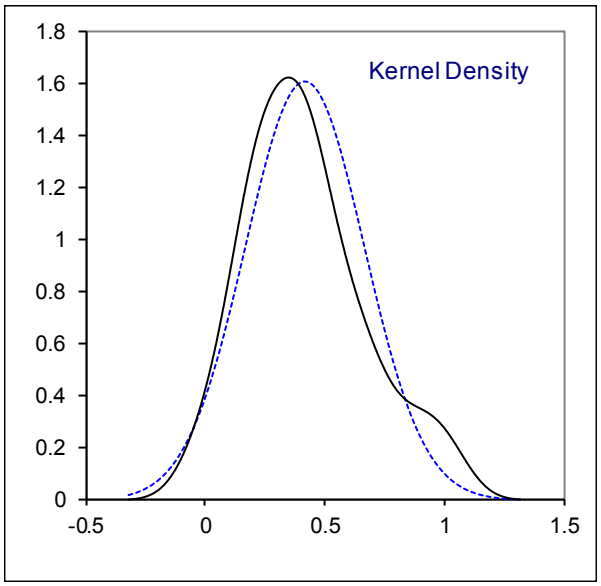
Determination of Sodium as Na on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP621	0.7		0.35	
62		-----		-----	
120		-----		-----	
131	IP501	0.153		-0.33	
140	D5708	0		-0.52	
150	IP501	1		0.72	
154		-----		-----	
158		-----		-----	
159	D5708	0		-0.52	
171	D5708	<1		-----	
225	IP501	0.53		0.14	
311	IP621	0.4		-0.02	
313		-----		-----	
317		-----		-----	
323	IP621	0.2		-0.27	
333		-----		-----	
334		-----		-----	
356	IP621	0.1		-0.39	
372	IP621	0.4		-0.02	
381		-----		-----	
403	IP621	0.26		-0.20	
445	IP621	0.6		0.23	
463		-----		-----	
657	IP501	<1		-----	
663	IP501	0.2		-0.27	
732	IP501	0.2		-0.27	
750		-----		-----	
752		-----		-----	
781	IP621	0.6		0.23	
785	IP470	0.45		0.04	
798		-----		-----	
823		-----		-----	
874		-----		-----	
875	IP621	0.17		-0.31	
904		-----		-----	
994	IP501	0.6		0.23	
995	IP621	0.4		-0.02	
997		-----		-----	
1011	D5863	< 0.1		-----	
1016	NEN6966	0.880		0.57	
1065	UOP389	0.40		-0.02	
1108	D7111	0.70		0.35	
1134	IP621	0.853		0.54	
1191	D5185	0.15		-0.33	
1212	IP621	0.25		-0.21	
1229	In house	0.25		-0.21	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556	IP621	0.359		-0.07	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635	D5185	1		0.72	
1677	IP621	0.47		0.07	
1741	IP501	<1		-----	
1776		-----		-----	
1796		-----		-----	
1833	IP501	0.344		-0.09	
1857	IP621	0.50		0.10	
1862	IP621	0.24		-0.22	
1934	IP621	0.26		-0.20	
1949	IP621	0.42		0.00	
1967	IP501	0.50		0.10	
6024		-----		-----	
6025	IP470	0.4		-0.02	
6026	IP PM CW	0.3328		-0.11	
6057	IP621	0.7		0.35	
6114	IP501	0.3		-0.15	
6201	IP621	0.432		0.02	
6203		-----		-----	

normality	OK
n	40
outliers	0
mean (n)	0.418
st.dev. (n)	0.2488
R(calc.)	0.697
st.dev.(IP621:16)	0.8053
R(IP621:16)	2.255

Application range: 0.6 – 11.2 mg/kg



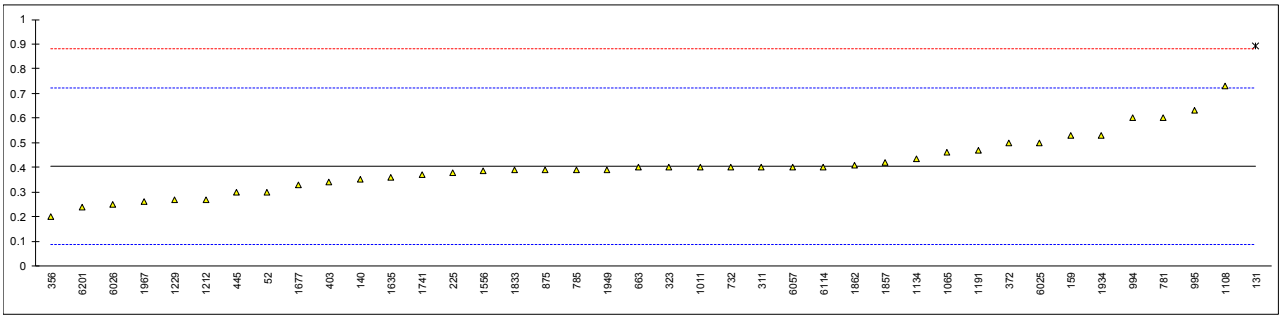


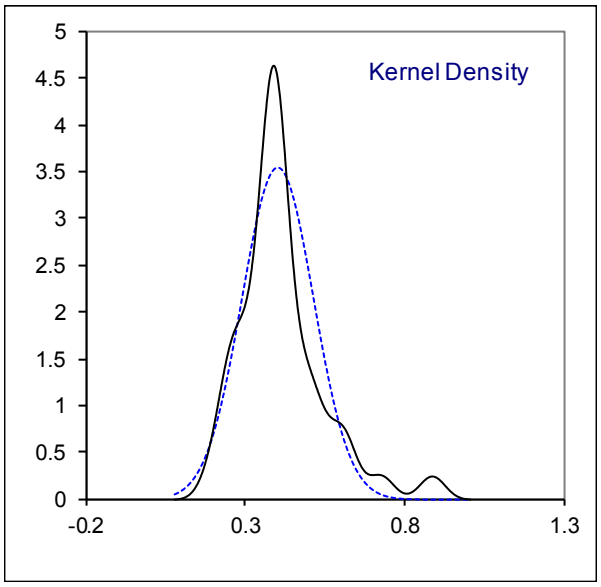
Determination of Vanadium as V on sample #18255; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52	IP621	0.3		-0.66	
62		-----		-----	
120		-----		-----	
131	IP501	0.891	R(0.01)	3.06	
140	D5708	0.352		-0.33	
150	IP501	<1		-----	
154		-----		-----	
158		-----		-----	
159	D5708	0.53		0.79	
171	D5708	<1		-----	
225	IP501	0.38		-0.16	
311	IP621	0.4		-0.03	
313		-----		-----	
317		-----		-----	
323	IP621	0.4		-0.03	
333		-----		-----	
334		-----		-----	
356	IP621	0.2		-1.29	
372	IP621	0.5		0.60	
381		-----		-----	
403	IP621	0.34		-0.41	
445	IP621	0.3		-0.66	
463		-----		-----	
657	IP501	<1		-----	
663	IP501	0.4		-0.03	
732	IP501	0.4		-0.03	
750		-----		-----	
752		-----		-----	
781	IP621	0.6		1.23	
785	IP470	0.39		-0.09	
798		-----		-----	
823		-----		-----	
874		-----		-----	
875	IP621	0.39		-0.09	
904		-----		-----	
994	IP501	0.6		1.23	
995	IP621	0.63		1.42	
997		-----		-----	
1011	In house	0.4		-0.03	
1016	In house	<2		-----	
1065	UOP389	0.46		0.35	
1108	D7111	0.73		2.04	
1134	IP621	0.436		0.20	
1191	D5185	0.47		0.41	
1212	IP621	0.27		-0.85	
1229	In house	0.269		-0.85	
1379		-----		-----	
1397		-----		-----	
1543		-----		-----	
1556	IP621	0.386		-0.12	
1585		-----		-----	
1586		-----		-----	
1613		-----		-----	
1635	D5185	0.36		-0.28	
1677	IP621	0.33		-0.47	
1741	UOP407	0.37		-0.22	
1776		-----		-----	
1796		-----		-----	
1833	IP501	0.388		-0.11	
1857	IP621	0.42		0.10	
1862	IP621	0.41		0.03	
1934	IP621	0.53		0.79	
1949	IP621	0.39		-0.09	
1967	IP501	0.263		-0.89	
6024		-----		-----	
6025	IP470	0.5		0.60	
6026	IP PM CW	0.2507		-0.97	
6057	IP621	0.4		-0.03	
6114	IP501	0.4		-0.03	
6201	IP621	0.240		-1.04	
6203		-----		-----	

normality	OK
n	39
outliers	1
mean (n)	0.405
st.dev. (n)	0.1124
R(calc.)	0.315
st.dev.(IP621:16)	0.1591
R(IP621:16)	0.446

Application range: 0.5 – 12.2 mg/kg





Determination of Simulated Distillation acc. to ASTM D6352 on sample #18255; result in °C

lab	method	IBP	10%	30%	50%	70%	90%	FBP
52	D6352	302.5	364.0	411.0	441.0	482.5	530.0	599.5
62		-----	-----	-----	-----	-----	-----	-----
120		-----	-----	-----	-----	-----	-----	-----
131		304	370	415	447	482	531	599 C
140		-----	-----	-----	-----	-----	-----	-----
150	D7169	304.5	369.5	415.0	447.5	483.5	530.5	595.0
154		-----	-----	-----	-----	-----	-----	-----
158	D7169	311.81	372.78	416.97	448.60	483.95	530.42	586.44
159		-----	-----	-----	-----	-----	-----	-----
171	D2887	311.0	371.7	415.8	447.7	483.5	531.0	601.7
225		-----	-----	-----	-----	-----	-----	-----
311	D6352	309.5	370.5	415.5	448.0	484.0	529.5	589.0
313		-----	-----	-----	-----	-----	-----	-----
317	D6352	306.8	371.7	416.6	447.6	481.3	524.8	578.1
323	D6352	**269.7**	374.4 C	416.6	445.1 C	477.5 C	521.6 C	607.9
333		-----	-----	-----	-----	-----	-----	-----
334		-----	-----	-----	-----	-----	-----	-----
356		-----	-----	-----	-----	-----	-----	-----
372		-----	-----	-----	-----	-----	-----	-----
381		-----	-----	-----	-----	-----	-----	-----
403		-----	-----	-----	-----	-----	-----	-----
445	D7169	309.9	370.6	415.6	447.8	483.6	531.0	600.9
463		-----	-----	-----	-----	-----	-----	-----
657	D6352	304	368	413	444	480	528	604
663		-----	-----	-----	-----	-----	-----	-----
732		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
752		-----	-----	-----	-----	-----	-----	-----
781	D6352	303	369	414	445	481	528	591
785		-----	-----	-----	-----	-----	-----	-----
798		-----	-----	-----	-----	-----	-----	-----
823		-----	-----	-----	-----	-----	-----	-----
874		-----	-----	-----	-----	-----	-----	-----
875		-----	-----	-----	-----	-----	-----	-----
904		-----	-----	-----	-----	-----	-----	-----
994		-----	-----	-----	-----	-----	-----	-----
995		-----	-----	-----	-----	-----	-----	-----
997		-----	-----	-----	-----	-----	-----	-----
1011		-----	-----	-----	-----	-----	-----	-----
1016	D7169	301.5	371.5	417.0	450.0	486.5	534.5	**647.0**
1065		297.6	370.8	416.8	449.6	485.2	531.2	591.6
1108		-----	-----	-----	-----	-----	-----	-----
1134		-----	-----	-----	-----	-----	-----	-----
1191		-----	-----	-----	-----	-----	-----	-----
1212		-----	-----	-----	-----	-----	-----	-----
1229		-----	-----	-----	-----	-----	-----	-----
1379		-----	-----	-----	-----	-----	-----	-----
1397		**277**	**360**	**407**	440 ex	476 ex	525 ex	605 ex
1543		-----	-----	-----	-----	-----	-----	-----
1556	D2887	308.60	372.69	417.47	449.43	485.10	532.05	592.48
1585		-----	-----	-----	-----	-----	-----	-----
1586		-----	-----	-----	-----	-----	-----	-----
1613		-----	-----	-----	-----	-----	-----	-----
1635		-----	-----	-----	-----	-----	-----	-----
1677		-----	-----	-----	-----	-----	-----	-----
1741		-----	-----	-----	-----	-----	-----	-----
1776		-----	-----	-----	-----	-----	-----	-----
1796		-----	-----	-----	-----	-----	-----	-----
1833	D7169	316.2	366.4	**408.5**	439.8	475.8	524.4	603.9
1857		-----	-----	-----	-----	-----	-----	-----
1862		-----	-----	-----	-----	-----	-----	-----
1934	D7169	**264**	369	413	445	480	528	584
1949	D6352	313.8 C	372.6 C	417.6 C	449.6 C	485.6 C	532.8 C	603.6 C
1967		-----	-----	-----	-----	-----	-----	-----
6024		-----	-----	-----	-----	-----	-----	-----
6025		-----	-----	-----	-----	-----	-----	-----
6026		-----	-----	-----	-----	-----	-----	-----
6057		-----	-----	-----	-----	-----	-----	-----
6114		-----	-----	-----	-----	-----	-----	-----
6201	D7169	306	368	412	444	480	528	620
6203		-----	-----	-----	-----	-----	-----	-----

	IBP	10%	30%	50%	70%	90%	FBP
normality	OK	OK	OK	OK	OK	OK	OK
n	16	18	17	18	18	18	17
outliers	3	1	2	0 + 1ex	0 + 1ex	0 + 1ex	1 + 1ex
mean (n)	306.92	370.18	415.23	446.49	482.28	529.26	596.95
st.dev. (n)	4.948	2.532	1.991	2.935	2.859	3.187	10.083
R(calc.)	13.86	7.09	5.58	8.22	8.00	8.92	28.23
st.dev.(D6352:15)	17.536	2.536	2.107	2.286	2.571	3.750	13.607
R(D6352:15)	49.1	7.1	5.9	6.4	7.2	10.5	38.1

Bold and underlined test results are marked as statistical outliers.

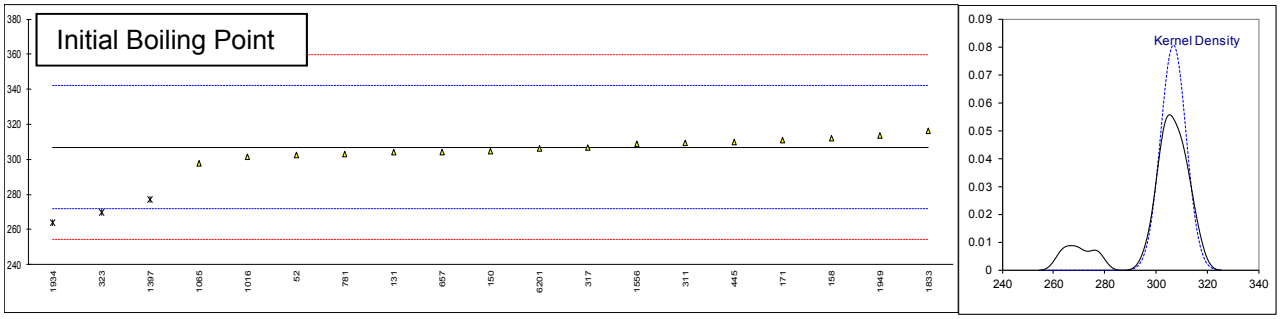
Lab 131 first reported 640

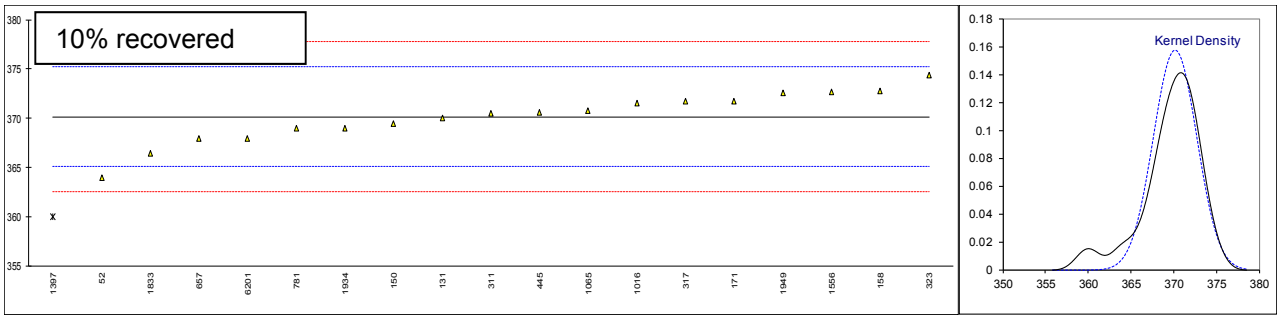
Lab 323 first reported: 390.8, 467.5, 501.9 and 548.5 respectively

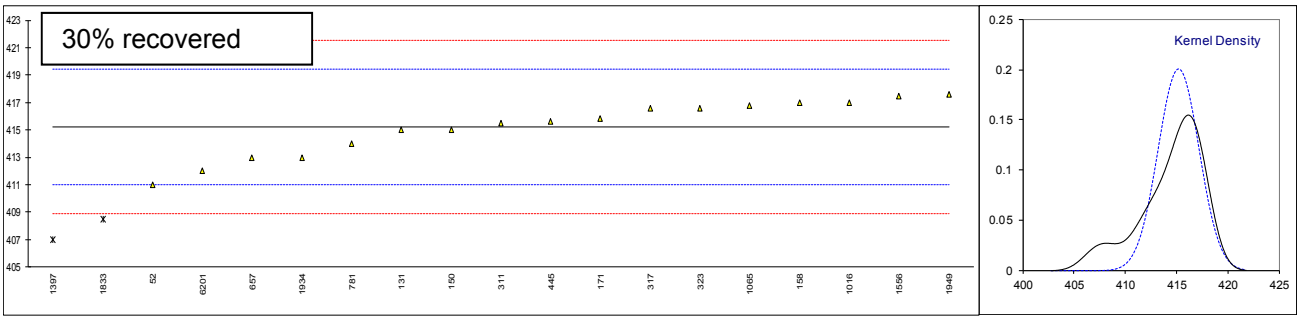
Lab 1949 first reported: 302.6, 361.8, 405.6, 437.2, 473.0, 519.4 and 578.4 respectively

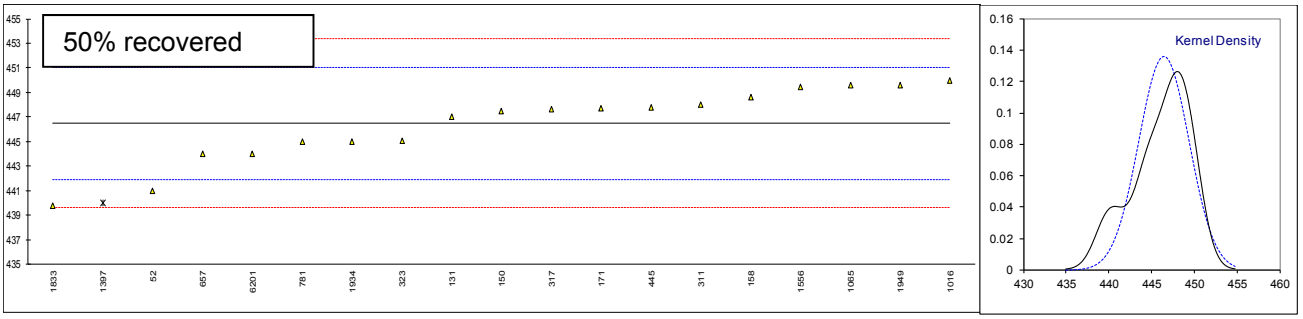
z-scores

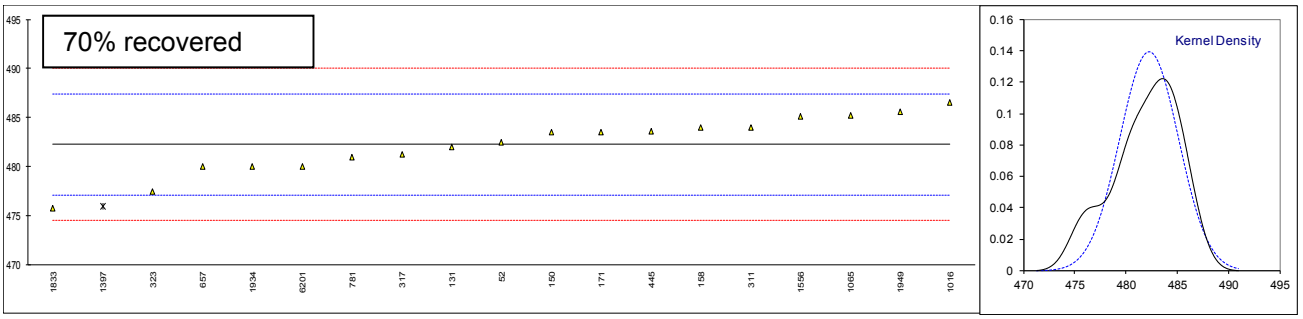
lab	IBP	10%	30%	50%	70%	90%	FBP
52	-0.25	-2.44	-2.01	-2.40	0.09	0.20	0.19
131	-0.17	-0.07	-0.11	0.23	-0.11	0.46	0.15
150	-0.14	-0.27	-0.11	0.44	0.47	0.33	-0.14
158	0.28	1.03	0.82	0.93	0.65	0.31	-0.77
171	0.23	0.60	0.27	0.53	0.47	0.46	0.35
311	0.15	0.13	0.13	0.66	0.67	0.06	-0.58
317	-0.01	0.60	0.65	0.49	-0.38	-1.19	-1.39
323	-2.12	1.67	0.65	-0.61	-1.86	-2.04	0.80
445	0.17	0.17	0.17	0.58	0.51	0.46	0.29
657	-0.17	-0.86	-1.06	-1.09	-0.89	-0.34	0.52
781	-0.22	-0.46	-0.58	-0.65	-0.50	-0.34	-0.44
1016	-0.31	0.52	0.84	1.54	1.64	1.40	3.68
1065	-0.53	0.25	0.74	1.36	1.14	0.52	-0.39
1397	-1.71	-4.01	-3.91	-2.84	-2.44	-1.14	0.59
1556	0.10	0.99	1.06	1.29	1.10	0.74	-0.33
1833	0.53	-1.49	-3.19	-2.92	-2.52	-1.30	0.51
1934	-2.45	-0.46	-1.06	-0.65	-0.89	-0.34	-0.95
1949	0.39	0.96	1.12	1.36	1.29	0.94	0.49
6201	-0.05	-0.86	-1.53	-1.09	-0.89	-0.34	1.69

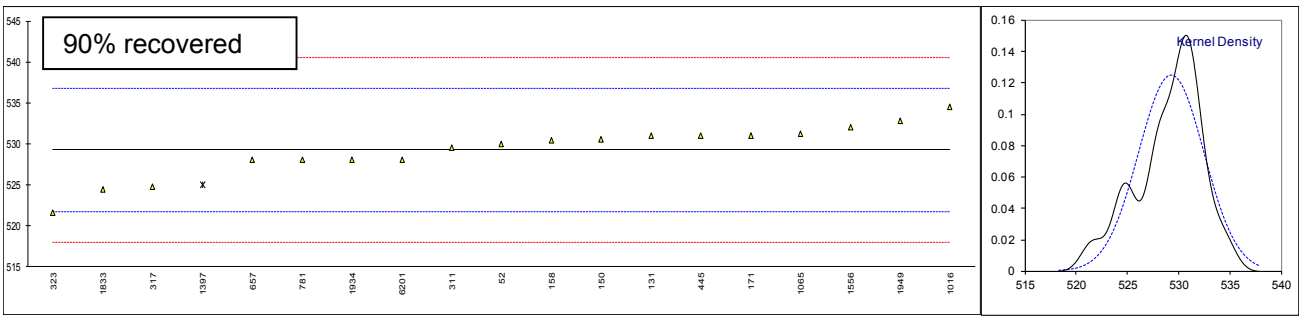


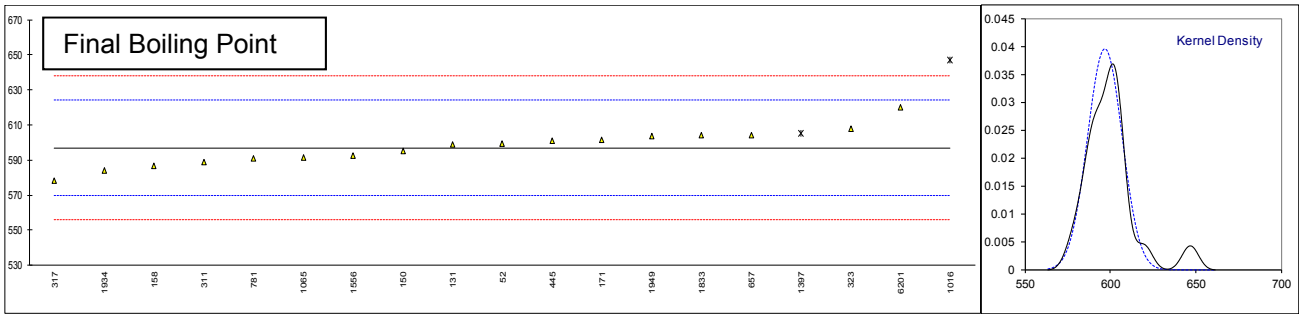



30% recovered
Kernel Density


50% recovered
Kernel Density


70% recovered
Kernel Density


90% recovered
Kernel Density


Final Boiling Point
Kernel Density

Determination of Distillation acc. to ASTM D1160 (as AET) on sample #18255; result in °C

lab	method	IBP	10%	30%	50%	70%	90%	FBP
52		-----	-----	-----	-----	-----	-----	-----
62		-----	-----	-----	-----	-----	-----	-----
120		-----	-----	-----	-----	-----	-----	-----
131		-----	-----	-----	-----	-----	-----	-----
140		-----	-----	-----	-----	-----	-----	-----
150	D1160	343 C	401	428	457	487	531	549
154		-----	-----	-----	-----	-----	-----	-----
158	D1160	334.27	388.5	424.61	454.27	485.72	531.77	563.2
159		-----	-----	-----	-----	-----	-----	-----
171	D1160	342.9	395.7	431.6	459.8	493.5	528.9	557.8
225		-----	-----	-----	-----	-----	-----	-----
311	D1160	335	391	420	449	484	528	554
313		-----	-----	-----	-----	-----	-----	-----
317		-----	-----	-----	-----	-----	-----	-----
323		-----	-----	-----	-----	-----	-----	-----
333		-----	-----	-----	-----	-----	-----	-----
334	D1160	302	396	428	457	489	531	531
356	D1160	347	401	433	461	492	537	572
372		338	389	421	449	482	526	552
381		-----	-----	-----	-----	-----	-----	-----
403		-----	-----	-----	-----	-----	-----	-----
445	D1160	314	387	422	450	485	532	545
463	D1160	325	389	424	454	484	524	556
657	D1160	303	390	425	455	484	531	533
663		-----	-----	-----	-----	-----	-----	-----
732		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
752		-----	-----	-----	-----	-----	-----	-----
781	D1160	307	389	424	455	489	531	541
785	D1160	314.5	390.2	425.8	454.8	489.3	535.6	548.8
798		-----	-----	-----	-----	-----	-----	-----
823		-----	-----	-----	-----	-----	-----	-----
874		-----	-----	-----	-----	-----	-----	-----
875	D1160	311.2	381.0 C	421.1 C	443.4	476.7	525.2	546.3
904		-----	-----	-----	-----	-----	-----	-----
994		-----	-----	-----	-----	-----	-----	-----
995		-----	-----	-----	-----	-----	-----	-----
997		-----	-----	-----	-----	-----	-----	-----
1011	D1160	346	394.3	428.3	455.4	487.4	531.6	558.6
1016		-----	-----	-----	-----	-----	-----	-----
1065		-----	-----	-----	-----	-----	-----	-----
1108	D1160	311.1	378.0	418.0	449.6	480.5	527.3	562.2
1134	D1160	331	395	428	456	487	531	554
1191		-----	-----	-----	-----	-----	-----	-----
1212		-----	-----	-----	-----	-----	-----	-----
1229		-----	-----	-----	-----	-----	-----	-----
1379		-----	-----	-----	-----	-----	-----	-----
1397	D1160	353.1	395	428.6	455.6	489.5	536.9	572.5
1543		-----	-----	-----	-----	-----	-----	-----
1556		-----	-----	-----	-----	-----	-----	-----
1585	D1160	339.8	387.1	422.2	451.8	480.9	529.2	559.3
1586	D1160	355	393	425	450	478	**514**	541 C
1613	D1160	360.2	387.6	424.6	454.5	485.4	532.6	-----
1635		**185.9**	398.7	427.6	455.6	485.4	524.8	561.4
1677	D1160	330	387	424	454	486	533	569
1741	D1160	338.8	391.5	424.4	452.2	481.5	522.5	559.2
1776		-----	-----	-----	-----	-----	-----	-----
1796		342	393	426	456	487	533	557
1833		-----	-----	-----	-----	-----	-----	-----
1857	D1160	338.1	385.8	422.8	450.6	481.1	526.9	560.5
1862	D1160	335	390	426	455	487	533	551
1934	D1160	335.2	397.3	426.3	455.2	487.2	533.1	559.0
1949	D1160	336.2	390.0	425.1	453.6	485.3	531.7	554.5
1967	D1160	339	391	422	452	483	535	552
6024		-----	-----	-----	-----	-----	-----	-----
6025	D1160	347	392	427	463	492	538	554
6026	D1160	340	389	422	454	487	532	558
6057	D1160	342.5	389.1	425.4	453.1	487.1	**547.9**	584.3
6114	D1160	320.9	391.7	426.8	458.2	492.6	533.7	537.0
6201	D1160	**233**	386	417	447	481	534	557
6203	D1160	321.0	386.7	422.6	450.5	481.5	530.0	563.8

	IBP	10%	30%	50%	70%	90%	FBP
normality	OK	OK	OK	OK	OK	OK	OK
n	33	35	35	35	35	33	34
outliers	2	0	0	0	0	2	0
mean (n)	332.69	390.78	424.79	453.78	485.56	530.96	555.13
st.dev. (n)	15.164	4.925	3.403	3.902	4.027	3.800	11.107
R(calc.)	42.46	13.79	9.53	10.92	11.28	10.64	31.10
st.dev.(D1160:18)	17.660	5.259	4.003	3.944	3.364	8.026	9.605
R(D1160:18)	49.45	14.73	11.21	11.04	9.42	22.47	26.89

Bold and underlined test results are marked as statistical outliers.

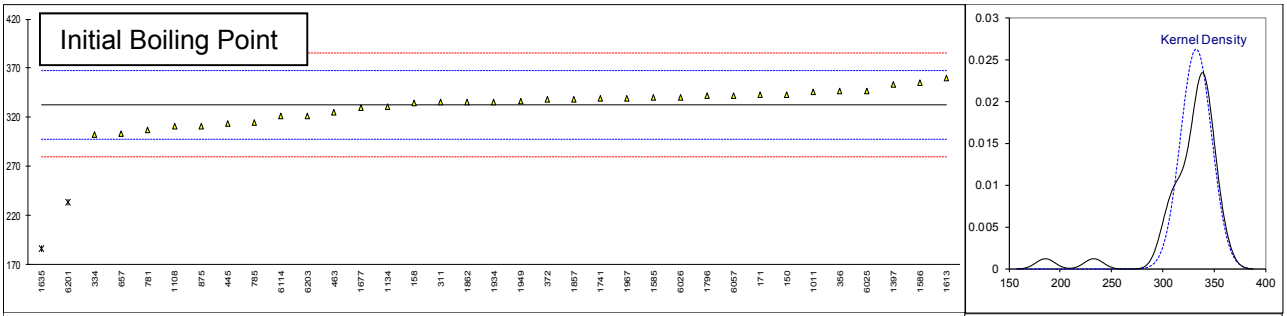
Lab 150 first reported 238

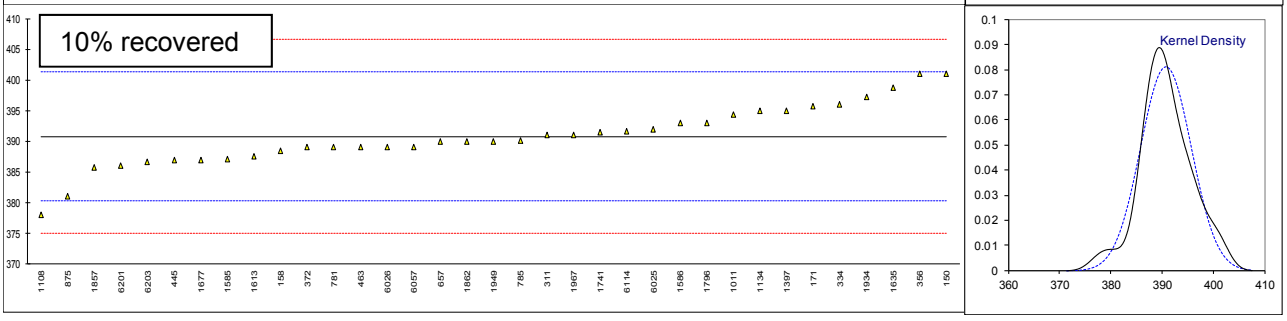
Lab 875 first reported 374.6 and 412.1 respectively

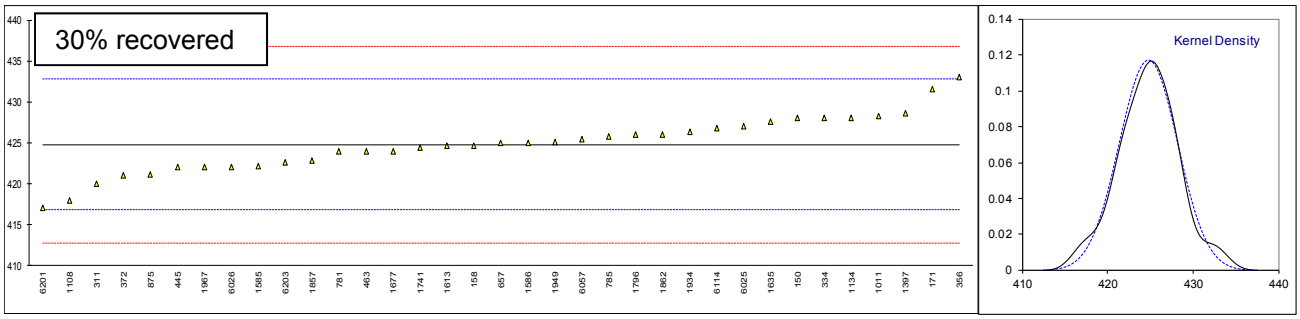
Lab 1586 first reported 521

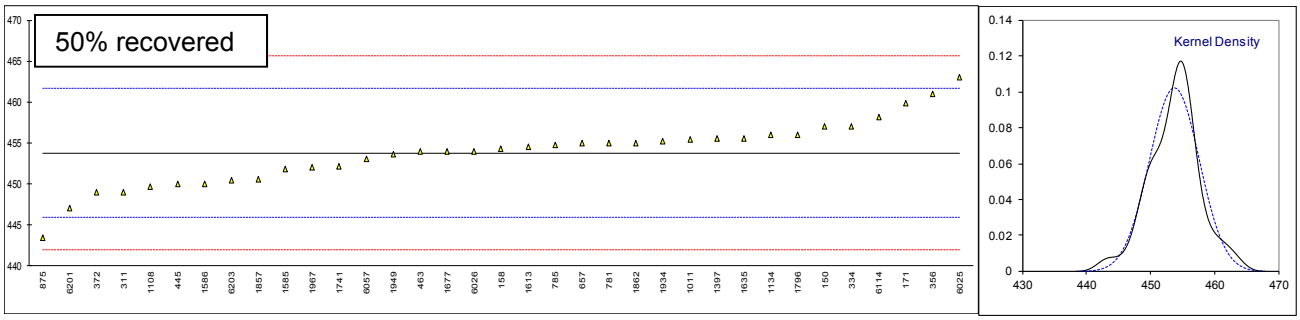
z-scores

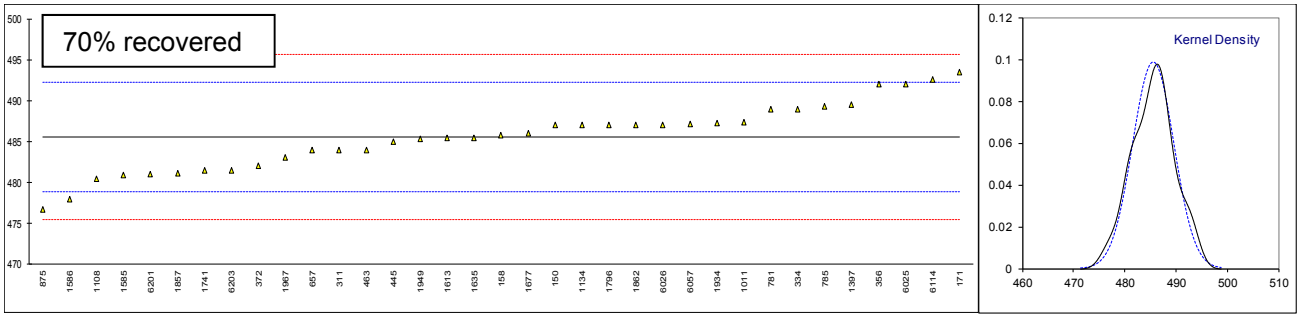
lab	IBP	10%	30%	50%	70%	90%	FBP
150	0.58	1.94	0.80	0.82	0.43	0.00	-0.64
158	0.09	-0.43	-0.05	0.13	0.05	0.10	0.84
171	0.58	0.94	1.70	1.53	2.36	-0.26	0.28
311	0.13	0.04	-1.20	-1.21	-0.46	-0.37	-0.12
334	-1.74	0.99	0.80	0.82	1.02	0.00	-2.51
356	0.81	1.94	2.05	1.83	1.91	0.75	1.76
372	0.30	-0.34	-0.95	-1.21	-1.06	-0.62	-0.33
445	-1.06	-0.72	-0.70	-0.96	-0.17	0.13	-1.05
463	-0.44	-0.34	-0.20	0.06	-0.46	-0.87	0.09
657	-1.68	-0.15	0.05	0.31	-0.46	0.00	-2.30
781	-1.45	-0.34	-0.20	0.31	1.02	0.00	-1.47
785	-1.03	-0.11	0.25	0.26	1.11	0.58	-0.66
875	-1.22	-1.86	-0.92	-2.63	-2.63	-0.72	-0.92
1011	0.75	0.67	0.88	0.41	0.55	0.08	0.36
1108	-1.22	-2.43	-1.70	-1.06	-1.50	-0.46	0.74
1134	-0.10	0.80	0.80	0.56	0.43	0.00	-0.12
1397	1.16	0.80	0.95	0.46	1.17	0.74	1.81
1585	0.40	-0.70	-0.65	-0.50	-1.39	-0.22	0.43
1586	1.26	0.42	0.05	-0.96	-2.25	-2.11	-1.47
1613	1.56	-0.60	-0.05	0.18	-0.05	0.20	-----
1635	-8.31	1.51	0.70	0.46	-0.05	-0.77	0.65
1677	-0.15	-0.72	-0.20	0.06	0.13	0.25	1.44
1741	0.35	0.14	-0.10	-0.40	-1.21	-1.05	0.42
1796	0.53	0.42	0.30	0.56	0.43	0.25	0.19
1857	0.31	-0.95	-0.50	-0.81	-1.33	-0.51	0.56
1862	0.13	-0.15	0.30	0.31	0.43	0.25	-0.43
1934	0.14	1.24	0.38	0.36	0.49	0.27	0.40
1949	0.20	-0.15	0.08	-0.04	-0.08	0.09	-0.07
1967	0.36	0.04	-0.70	-0.45	-0.76	0.50	-0.33
6025	0.81	0.23	0.55	2.34	1.91	0.88	-0.12
6026	0.41	-0.34	-0.70	0.06	0.43	0.13	0.30
6057	0.56	-0.32	0.15	-0.17	0.46	2.11	3.04
6114	-0.67	0.18	0.50	1.12	2.09	0.34	-1.89
6201	-5.64	-0.91	-1.95	-1.72	-1.36	0.38	0.19
6203	-0.66	-0.78	-0.55	-0.83	-1.21	-0.12	

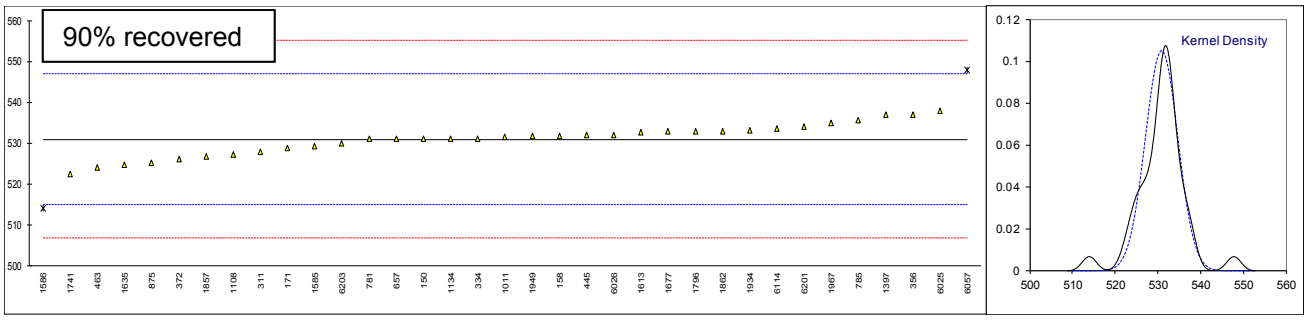


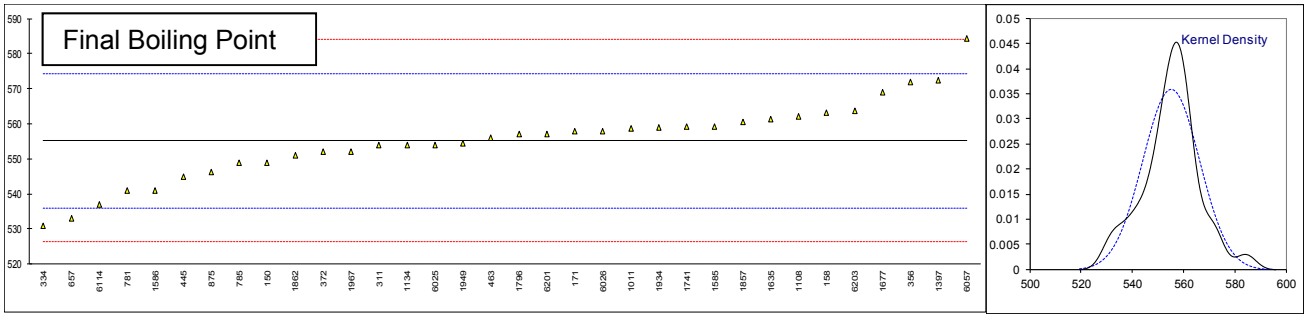



30% recovered
Kernel Density


50% recovered
Kernel Density


70% recovered
Kernel Density


90% recovered
Kernel Density


Final Boiling Point
Kernel Density

APPENDIX 2 Summary of other reported test results

Reported test results of other elements on sample #18255; results in mg/kg.

lab	method	Arsenic as As	method	Copper as Cu	method	Silicon as Si
52		-----	IP621	<0.1	IP470	<10
62		-----		-----		-----
120		-----		-----		-----
131	IP501	0	IP501	0.627	IP501	0
140	D5708	0.285	D5708	0.012	D5708	0.188
150		-----		-----	IP501	<10
154		-----		-----		-----
158		-----		-----		-----
159		-----		-----		-----
171	D5708	<1	D5708	<1	D5708	<1
225		-----	IP501	0.03	IP501	1.16
311		-----	IP621	<0.1	UOP796	1
313		-----		-----		-----
317		-----		-----		-----
323		-----		-----	IP501	<10
333		-----		-----		-----
334		-----		-----		-----
356		-----	IP621	0.1		-----
372		-----	IP621	<0.1	IP470	<1
381		-----		-----		-----
403		-----	IP621	<0.1	IP621	<0.1
445		-----	IP621	<0.1		-----
463		-----		-----		-----
657		-----	IP501	<1	IP501	<10
663		-----		-----	IP501	0.0
732		-----		-----		-----
750		-----		-----		-----
752		-----		-----		-----
781	UOP986	0.041	IP621	<0.1	IP501	0.2
785		-----	IP470	0.02	IP470	0.27
798		-----		-----		-----
823		-----		-----		-----
874		-----		-----		-----
875		-----	IP621	0.009		-----
904		-----		-----		-----
994		-----	IP501	<0.1	IP501	<10
995		-----	IP621	<0.1	IP470	0.9
997		-----		-----		-----
1011		-----		-----		-----
1016		-----		-----		-----
1065	UOP389	0.05	UOP389	0.006	UOP389	0.06
1108		-----	D7111	0.05	D5708	<0.5
1134		-----	IP621	-0.04	IP621	3.00
1191		-----	D5185	0.01	D5185	0.46
1212		-----	IP621	0.02		-----
1229		-----	In house	<0,02		-----
1379		-----		-----		-----
1397		-----		-----		-----
1543		-----		-----		-----
1556		-----	IP621	0.047		-----
1585		-----		-----		-----
1586		-----		-----		-----
1613		-----		-----		-----
1635	D5185	2	D5185	0.26	D5185	0.28
1677	IP621	0.10	IP621	<0.01	IP501	1.2
1741		-----	UOP407	<0,10	IP501	<10
1776		-----		-----		-----
1796		-----		-----		-----
1833		-----		-----	IP501	0.355
1857		-----	IP621	<0.05	IP501	<5
1862		-----	IP621	<0.1	IP501	0.6
1934	In house	0.1	IP621	0.19	IP501	0.1
1949		-----	IP621	0.004	IP501	0.1
1967		-----		0.005	IP501	0.1
6024		-----		-----		-----
6025		-----		-----		-----
6026		-----	IP PM CW	0.0054		-----
6057		-----		-----	IP621	<0,1
6114		-----	IP501	0.5	IP501	0.6
6201	In house	<0.010	IP621	0.005	IP501	0.06
6203		-----		-----		-----

APPENDIX 3

Number of participants per country

1 lab in	AZERBAIJAN
1 lab in	BELGIUM
2 labs in	CANADA
1 lab in	COTE D'IVOIRE
2 labs in	CROATIA
1 lab in	DENMARK
2 labs in	ESTONIA
2 labs in	FINLAND
2 labs in	FRANCE
3 labs in	GEORGIA
1 lab in	GERMANY
1 lab in	GREECE
1 lab in	ISRAEL
1 lab in	JORDAN
1 lab in	KAZAKHSTAN
1 lab in	LATVIA
2 labs in	MALTA
5 labs in	NETHERLANDS
1 lab in	PORTUGAL
2 labs in	ROMANIA
16 labs in	RUSSIAN FEDERATION
2 labs in	SERBIA
1 lab in	SINGAPORE
1 lab in	SOUTH KOREA
1 lab in	SUDAN
4 labs in	SWEDEN
1 lab in	THAILAND
2 labs in	TURKEY
2 labs in	UNITED KINGDOM
8 labs in	UNITED STATES OF AMERICA

APPENDIX 4

Abbreviations:

C	= final test result after checking of first reported suspect test result
D(0.01)	= outlier in Dixon's outlier test
D(0.05)	= straggler in Dixon's outlier test
G(0.01)	= outlier in Grubbs' outlier test
G(0.05)	= straggler in Grubbs' outlier test
DG(0.01)	= outlier in Double Grubbs' outlier test
DG(0.05)	= straggler in Double Grubbs' outlier test
R(0.01)	= outlier in Rosner's outlier test
R(0.05)	= straggler in Rosner's outlier test
E	= possibly an error in calculations
U	= test result possibly reported in a different unit
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
SDS	= Safety Data Sheet

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