



Institute for
Interlaboratory Studies

Results of Proficiency Test Naphtha April 2023

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

Author: ing. M. Meijer

Correctors: ing. G.A. Oosterlaken-Buijs & ing C.M. Nijssen-Wester

Approved by: ing. A.S. Noordman-de Neef

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1 INTRODUCTION

Since 1994 the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Naphtha every year. During the annual proficiency testing program of 2022/2023 it was decided to continue the round robin for the analysis of Naphtha.

In this interlaboratory study registered for participation:

- 87 laboratories in 38 countries for regular analyzes in Naphtha iis23N01
- 41 laboratories in 20 countries for Mercury Determination in Naphtha iis23N01Hg
- 34 laboratories in 17 countries for Arsenic & Lead Determination in Naphtha iis23N01AsPb
- 55 laboratories in 25 countries for Determination Vapor Pressure in Naphtha iis23N01DVPE

In total 90 laboratories in 39 countries registered for participation in one or more proficiency tests, see appendix 2 for the number of participants per country. In this report the results of the Naphtha proficiency tests are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory.

In this proficiency test the participants received, depending on the registration, from one up to four different samples of Naphtha, see table below.

Sample ID	PT ID	Quantity	Purpose
#23040	iis23N01	1x 500 mL	Regular analyzes
#23041	iis23N01Hg	1x 500 mL	Mercury
#23042	iis23N01AsPb	1x 500 mL	Arsenic and Lead
#23043	iis23N01DVPE	1x 250 mL	Vapor Pressure

Table 1: Naphtha samples used in iis23N01

Participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

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

2.2 PROTOCOL

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

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

For the preparation of the sample for the regular analyzes in Naphtha a batch of approximately 60 liters of Naphtha was obtained from a local refinery. After homogenization 105 amber glass bottles of 0.5 L were filled and labelled #23040.

The homogeneity of the subsamples was checked by the determination of Density at 15 °C in accordance with ISO12185 on 8 stratified randomly selected subsamples.

	Density at 15 °C in kg/L
sample #23040-1	0.71890
sample #23040-2	0.71891
sample #23040-3	0.71889
sample #23040-4	0.71891
sample #23040-5	0.71897
sample #23040-6	0.71894
sample #23040-7	0.71889
sample #23040-8	0.71890

Table 2: homogeneity test results of subsamples #23040

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)	0.00008
reference test method	ISO12185:96
0.3 x R (reference test method)	0.00015

Table 3: evaluation of the repeatability of subsamples #23040

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

For the preparation of the sample for the Mercury analysis in Naphtha a batch of approximately 40 liters of Naphtha was obtained from a local refinery and spiked with Mercury Chloride and a Mercury Conostan standard. After homogenization 65 amber glass bottles of 0.5 L were filled and labelled #23041.

The homogeneity of the subsamples was checked by the determination of Mercury in accordance with UOP938 on 8 stratified randomly selected subsamples.

	Mercury in µg/kg
sample #23041-1	143
sample #23041-2	143
sample #23041-3	146
sample #23041-4	150
sample #23041-5	145
sample #23041-6	143
sample #23041-7	146
sample #23041-8	155

Table 4: homogeneity test results of subsamples #23041

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

	Mercury in µg/kg
r (observed)	12
reference method	Horwitz
0.3 x R (reference method)	26

Table 5: evaluation of the repeatability of subsamples #23041

The calculated repeatability is in agreement with 0.3 times the estimated reproducibility calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the sample for the analyzes of Arsenic and Lead in Naphtha a batch of approximately 30 liters of Naphtha was obtained from a local refinery and spiked with an Arsenic Conostan standard and Aviation Gasoline for Lead. After homogenization 60 amber glass bottles of 0.5 L were filled and labelled #23042.

The homogeneity of the subsamples was checked by the determination of Lead in accordance with UOP952 on 8 stratified randomly selected subsamples.

	Lead in µg/kg
sample #23042-1	49
sample #23042-2	51
sample #23042-3	49
sample #23042-4	52
sample #23042-5	49
sample #23042-6	48
sample #23042-7	47
sample #23042-8	50

Table 6: homogeneity test results of subsamples #23042

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

	Lead in µg/kg
r (observed)	4
reference method	Horwitz
0.3 x R (reference method)	10

Table 7: evaluation of the repeatability of subsamples #23042

The calculated repeatability is in agreement with 0.3 times the estimated reproducibility calculated with the Horwitz equation. Therefore, homogeneity of the subsamples was assumed.

For the preparation of the sample for the analyzes of Vapor Pressure in Naphtha a batch of approximately 50 liters of Naphtha was obtained from a local refinery. After homogenization 75 amber glass bottles of 0.25 L were filled and labelled #23043.

The homogeneity of the subsamples was checked by the determination of DVPE in accordance with ASTM D5191 on 8 stratified randomly selected subsamples.

	DVPE in psi
sample #23043-1	6.32
sample #23043-2	6.32
sample #23043-3	6.33
sample #23043-4	6.39
sample #23043-5	6.32
sample #23043-6	6.32
sample #23043-7	6.32
sample #23043-8	6.32

Table 8: homogeneity test results of subsamples #23043

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.

	DVPE in psi
r (observed)	0.07
reference test method	ASTM D5191:22
0.3 x R (reference test method)	0.07

Table 9: evaluation of the repeatability of subsamples #23043

The calculated repeatability is in agreement with 0.3 times the 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 March 8, 2023. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Naphtha packed in amber glass 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 #23040: Organic Chlorides, Color Saybolt (automated and manual), Copper Corrosion 3 hrs at 50 °C, Density at 15 °C, Distillation at 760 mmHg (IBP, 50% recovered and FBP), Mercaptan Sulfur as S and Sulfur. On sample #23041 to determine Mercury as Hg.

On sample #23042 to determine Arsenic as As and Lead as Pb. There was also an extra question about rinsing of the bottle with strong acid.

On sample #23043 to determine Total Vapor Pressure and DVPE acc. to ASTM D5191.

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

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

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in 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 the original test results are placed under 'Remarks' in the 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.

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

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

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

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

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis. The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

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

3.3 Z-SCORES

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

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

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test some problems were encountered with the dispatch of the samples. Therefore, the reporting time on the data entry portal was extended with another two weeks. For the regular analyzes in Naphtha PT nine participants reported test results after the extended reporting date and thirteen other participants did not report any test results. For the Mercury analyzes in Naphtha PT three participants reported test results after the extended reporting date and fourteen other participants did not report any test results. For the Arsenic and Lead analyzes in Naphtha PT three participants reported test results after the extended reporting date and fourteen other participants did not report any test results. For the Vapor Pressure analyzes in Naphtha PT five participants reported test results after the extended reporting date and twelve other participants did not report any test results. Not all participants were able to report all tests requested.

In total 77 participants reported 600 numerical test results. Observed were 8 outlying test results, which is 1.3%. In proficiency tests outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER SAMPLE AND PER TEST

In this section the reported test results are discussed per sample and per test. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the original data in appendix 1. The abbreviations, used in these tables, are explained in appendix 3.

Unfortunately, a suitable reference test method providing the precision data is not available for all determinations. For these tests the calculated reproducibility was compared against the estimated reproducibility calculated with the Horwitz equation.

In the iis PT reports ASTM test methods are referred to with a number (e.g. D6045) and an added designation for the year that the test method was adopted or revised (e.g. D6045:20).

sample #23040

Organic Chlorides: This determination was very problematic. No statistical outliers were observed. It was decided not to calculate z-scores due to the large variation of the group compared to the target reproducibility.

Color Saybolt (automated): This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D6045:20.
When the test results are evaluated separately for cuvette sizes 50 mm or 100 mm the calculated reproducibilities are still not in agreement with the requirements of ASTM D6045:20.

Color Saybolt (manual): This determination was problematic. No statistical outliers were observed. The calculated reproducibility is not in agreement with the requirements of ASTM D156:15.

Copper Corrosion: This determination was not problematic. All reporting laboratories agreed on a result of 1 (1a).

Density at 15 °C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirement of ISO12185:96.

Distillation: This determination was not problematic. In total two statistical outliers were observed over three parameters. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D86:23 automated mode for 50% recovered and FBP but not in agreement for IBP.

Mercaptan Sulfur: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirement of ASTM D3227:16.

Sulfur: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D4294:21.

sample #23041

Mercury: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the estimated reproducibility calculated with the Horwitz equation, but not with the strict requirements of UOP938:20.

sample #23042

Arsenic: This determination was problematic for a number of laboratories. No statistical outliers were observed but five test results were excluded. The calculated reproducibility after rejection of the suspect data is in agreement with the estimated reproducibility calculated with the Horwitz equation. Please note that test methods like UOP946 prescribe to rinse the glass bottle with a strong acid to get all Arsenic released from the glass surface for the Arsenic determination. Also, when a portion of the sample is taken from the glass bottle. Therefore, it was requested whether the bottle is rinsed with a strong acid. Participants that reported to have rinsed the glass bottle found a higher amount of Arsenic. It is decided to exclude the test results from the statistical evaluation of participants that did not rinse with acid since the Naphtha PT sample is spiked with Arsenic standard.

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

sample #23043

Total Vapor Pressure: 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 D5191:22.

DVPE: 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 D5191:22.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Parameter	unit	n	average	2.8 * sd	R(lit)
Organic Chlorides	mg/kg	25	0.47	0.59	(0.11)
Color Saybolt (automated)		37	27.8	3.1	1.2
Color Saybolt (manual)		28	28.1	3.2	2
Copper Corrosion 3 hrs at 50 °C		53	1(1a)	n.a.	n.a.
Density at 15°C	kg/L	72	0.7190	0.0005	0.0005
Initial Boiling Point	°C	65	37.5	5.2	4.7
50% recovered	°C	65	107.8	2.2	4.1
Final Boiling Point	°C	63	165.8	6.1	7.1

Parameter	unit	n	average	2.8 * sd	R(lit)
Mercaptan Sulfur as S	mg/kg	47	75.9	8.7	6.3
Sulfur	mg/kg	65	260.2	39.4	69.1

Table 10: reproducibilities of tests on sample #23040

For results between brackets no z-scores are calculated.

Parameter	unit	n	average	2.8 * sd	R(target)
Mercury as Hg	µg/kg	27	118.7	58.3	73.3

Table 11: reproducibilities of tests on sample #23041

Parameter	unit	n	average	2.8 * sd	R(target)
Arsenic as As	µg/kg	4	45.6	14.6	32.5
Lead as Pb	µg/kg	17	54.3	40.4	37.7

Table 12: reproducibilities of tests on sample #23042

Parameter	unit	n	average	2.8 * sd	R(lit)
Total Vapor Pressure	psi	31	7.05	0.20	0.23
DVPE acc. to D5191	psi	41	6.26	0.20	0.23

Table 13: reproducibilities of tests on sample #23043

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 APRIL 2023 WITH PREVIOUS PTS

	April 2023	April 2022	April 2021	April 2020	April 2019
Number of reporting laboratories	77	85	90	74	93
Number of test results	600	682	753	1446	1635
Number of statistical outliers	8	21	17	130	73
Percentage of statistical outliers	1.3%	3.1%	2.3%	9.0%	4.5%

Table 14: comparison with previous proficiency tests

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

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

Parameter	April 2023	April 2022	April 2021	April 2020	April 2019
Organic Chlorides	(--)	(--)	-	--	--
Color Saybolt	-	-	--	--	+
Density at 15 °C	+/-	+	+	+/-	+

Parameter	April 2023	April 2022	April 2021	April 2020	April 2019
Distillation	+	+	+	+/-	+/-
Mercaptan Sulfur as S	-	-	-	-	-
Sulfur	+	+	+	+	+
Mercury	+	+	+	+	+
Arsenic	++	(--)	--	--	+/-
Lead	+/-	-	-	-	+/-
Total Vapor Pressure	+	+/-	-	-	-
DVPE acc. to D5191	+	+/-	-	-	-

Table 15: comparison of determinations to the reference test methods

For results between brackets no z-scores are calculated.

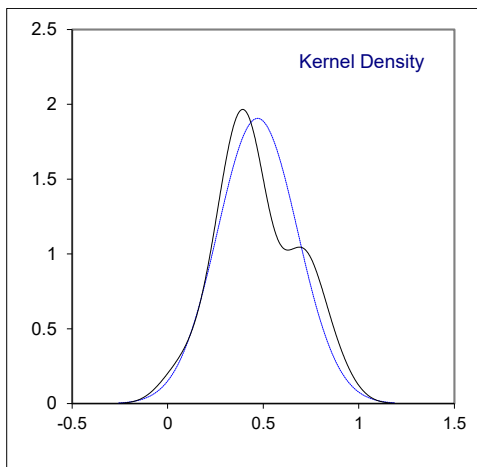
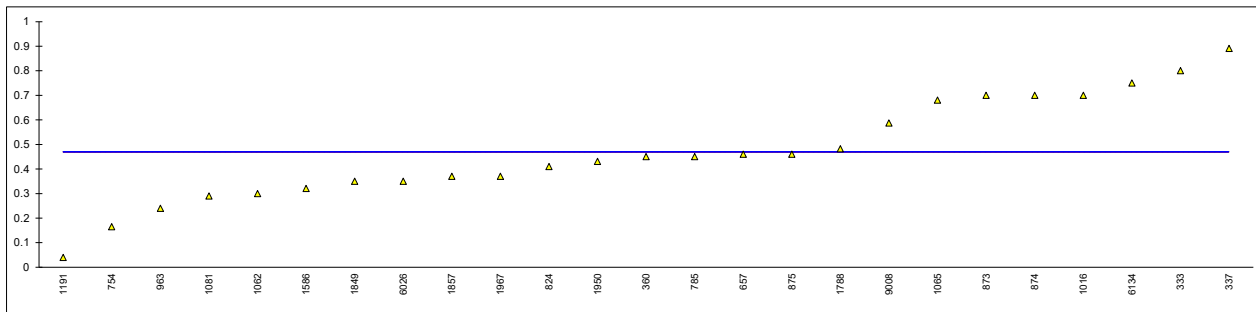
The following performance categories were used:

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

APPENDIX 1**Determination of Organic Chlorides on sample #23040; results in mg/kg**

lab	method	value	mark	z(targ)	remarks
140		----		----	
150		----		----	
158		----		----	
171	UOP779	<1		----	
225		----		----	
231		----		----	
237		----		----	
238		----		----	
311	D5808	<1		----	
323	UOP779	< 1		----	
328		----		----	
333	D5808	0.8		----	
334		----		----	
337	UOP779	0.89		----	
349	UOP588	<1		----	
360	UOP779	0.45		----	
399		----		----	
444	IP510	<1		----	
445		----		----	
492		----		----	
495		----		----	
541		----		----	
608		----		----	
657	UOP779	0.46		----	
750		----		----	
753		----		----	
754	UOP779	0.165		----	
779		----		----	
781	UOP779	<0.3		----	
785	UOP779	0.45		----	
798		----		----	
824	UOP779	0.41		----	
855		----		----	
862		----		----	
868		----		----	
872		----		----	
873	UOP779	0.7		----	
874	UOP779	0.7		----	
875	UOP779	0.46		----	
876		----		----	
912	D4929B	<1		----	
914		----		----	
922		----		----	
963	UOP779	0.24		----	
971	UOP779	<0.3		----	
974		----		----	
982		----		----	
994		----		----	
1012		----		----	
1016	In house	0.70		----	
1026		----		----	
1039		----		----	
1062	UOP779	0.3		----	
1065	D5808	0.68		----	
1081	D5808	0.29		----	
1097		----		----	
1135	UOP779	<1		----	
1191	UOP779	0.04		----	
1254		----		----	
1257		----		----	
1381		----		----	
1544		----		----	
1586	IP510	0.32		----	
1603	In house	<0.4		----	
1616		----		----	
1656		----		----	
1669	D7536	<1		----	
1720		----		----	
1737		----		----	
1776		----		----	
1788	D5808	0.482		----	
1849	D7359	0.35		----	
1857	UOP779	0.37		----	
1950	UOP779	0.43		----	
1960		----		----	

lab	method	value	mark	z(targ)	remarks
1967	UOP779	0.37		----	
1995				----	
6026	UOP779	0.35		----	
6134	D4929	0.75		----	
6185				----	
6198				----	
6200				----	
6229				----	
6238				----	
6299				----	
7009				----	
9008	D5808	0.5871		----	
normality		OK			
n		25			
outliers		0			
mean (n)		0.470			
st.dev. (n)		0.2092			
R(calc.)		0.586			
st.dev.(UOP779:08)		(0.0392)			
R(UOP779:08)		(0.110)			
Compare:					
R(Horwitz)		(0.236)			

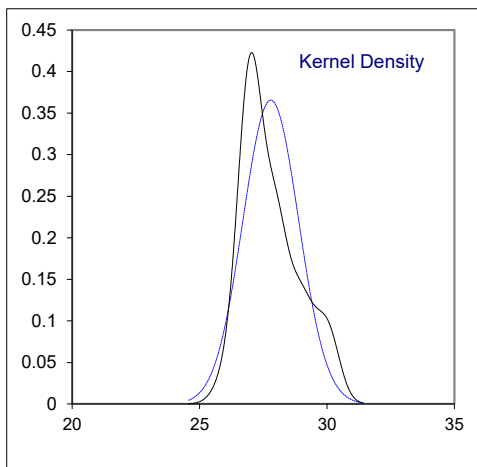
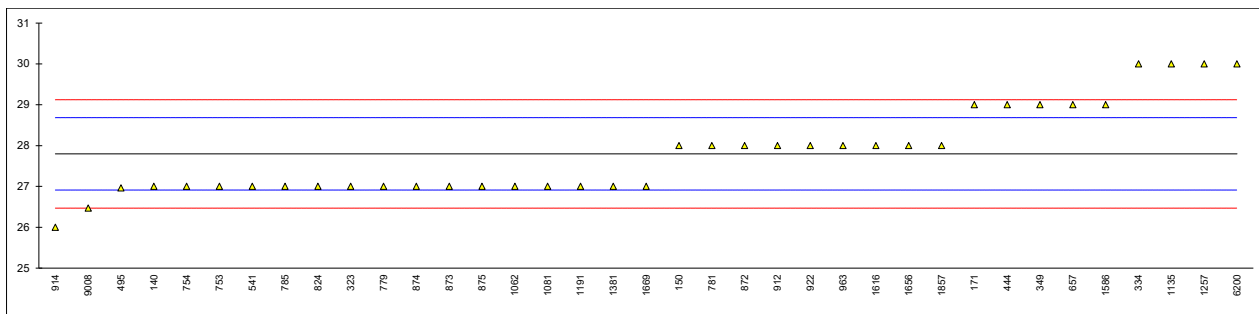


Determination of Color Saybolt (automated) on sample #23040

lab	method	value	mark	z(targ)	cuvette size	remarks
140	D6045	27		-1.80		
150	D6045	28		0.46	100 mm	
158		----		----		
171	D6045	29		2.72		
225		----		----		
231		----		----		
237		----		----		
238		----		----		
311		----		----		
323	D6045	27		-1.80	50 mm	
328		----		----		
333		----		----		
334	D6045	30		4.98		
337		----		----		
349	D6045	29		2.72		
360		----		----		
399		----		----		
444	D6045	29		2.72	100 mm	
445		----		----		
492		----		----		
495	D6045	26.96		-1.89	50 mm	
541	D6045	27		-1.80		
608		----		----		
657	D6045	29		2.72	100 mm	
750		----		----		
753	D6045	27		-1.80		
754	D6045	27		-1.80	100 mm	
779	D6045	27		-1.80	100 mm	
781	D6045	28		0.46	33 mm	
785	D6045	27.0		-1.80		
798		----		----		
824	D6045	27		-1.80	50 mm	
855		----		----		
862		----		----		
868		----		----		
872	D6045	28		0.46	100 mm	
873	D6045	27		-1.80	100 mm	
874	D6045	27		-1.80	100 mm	
875	D6045	27		-1.80	50 mm	
876		----		----		
912		28		0.46	50 mm	
914	D6045	26		-4.05	33 mm	
922	D6045	28		0.46	100 mm	
963	D6045	28		0.46		
971		----		----		
974		----		----		
982		----		----		
994		----		----		
1012		----		----		
1016		----		----		
1026		----		----		
1039		----		----		
1062	D6045	27		-1.80	100 mm	
1065		----		----		
1081	D6045	27		-1.80	100 mm	
1097		----		----		
1135	D6045	30		4.98	33 mm	
1191	D6045	27		-1.80		
1254		----		----		
1257	D6045	30		4.98		
1381	D6045	27.0		-1.80		
1544		----		----		
1586	D6045	29		2.72	50 mm	
1603		----		----		
1616	D6045	28		0.46	100 mm	
1656	D6045	28.0		0.46	50 mm	
1669		27	C	-1.80		first reported 23
1720		----		----		
1737		----		----		
1776		----		----		
1788		----		----		
1849		----		----		
1857	D6045	28		0.46	100 mm	
1950		----		----		
1960		----		----		

lab	method	value	mark	z(targ)	cuvette size	remarks
1967		----		----		
1995		----		----		
6026		----		----		
6134		----		----		
6185		----		----		
6198		----		----		
6200	D6045	30		4.98		
6229		----		----		
6238		----		----		
6299		----		----		
7009		----		----		
9008	D6045	26.47		-2.99	50 mm	

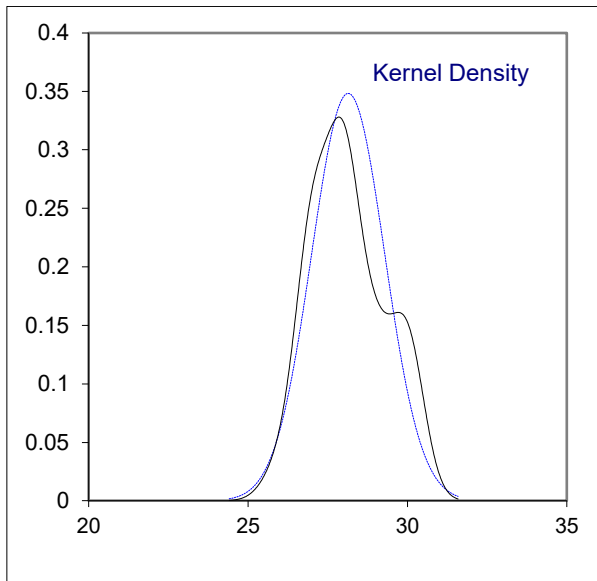
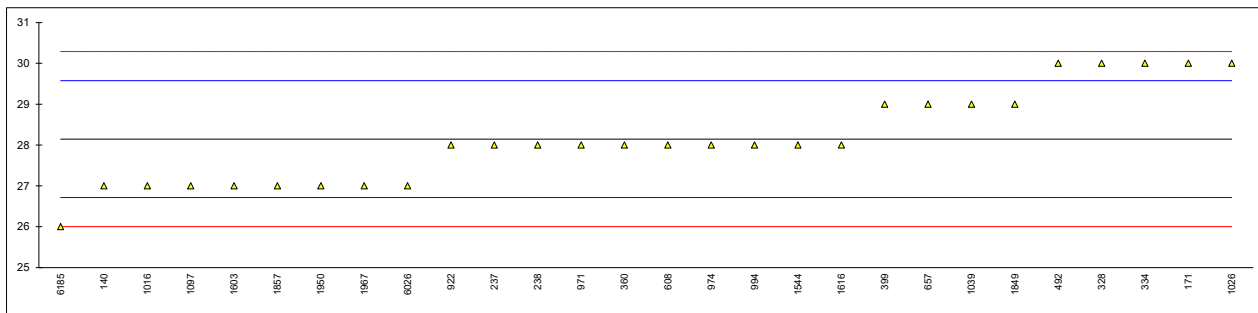
normality	OK	<u>50 mm cuvette only:</u>	<u>100 mm cuvette only:</u>
n	37	unknown	OK
outliers	0	8	13
mean (n)	27.795	27.429	27.692
st.dev. (n)	1.0913	0.8291	0.7511
R(calc.)	3.056	2.321	2.103
st.dev.(D6045:20)	0.4429	0.4429	0.4429
R(D6045:20)	1.24	1.24	1.24



Determination of Color Saybolt (manual) on sample #23040

lab	method	value	mark	z(targ)	filter	remarks
140	D156	27		-1.60		
150		----		----		
158		----		----		
171	D156	30		2.60		
225		----		----		
231		----		----		
237	D156	28		-0.20	1	
238	D156	28		-0.20		
311		----		----		
323		----		----		
328	D156	30		2.60		
333		----		----		
334	D156	30		2.60		
337		----		----		
349		----		----		
360	D156	28		-0.20	0.5	
399	D156	29		1.20		
444		----		----		
445		----		----		
492	D156	30		2.60		
495		----		----		
541		----		----		
608	D156	28		-0.20		
657	D156	29		1.20	0.5	
750		----		----		
753		----		----		
754		----		----		
779		----		----		
781		----		----		
785		----		----		
798		----		----		
824		----		----		
855		----		----		
862		----		----		
868		----		----		
872		----		----		
873		----		----		
874		----		----		
875		----		----		
876		----		----		
912		----		----		
914		----		----		
922	D156	28		-0.20	0.5	
963		----		----		
971	D156	28		-0.20		
974	D156	28		-0.20		
982		----		----		
994	D156	28		-0.20	0.5	
1012		----		----		
1016	D156	27	C	-1.60		test result was reported as automated
1026	D156	30		2.60		
1039	D156	29		1.20		
1062		----		----		
1065		----		----		
1081		----		----		
1097	NF M07-003	27		-1.60		
1135		----		----		
1191		----		----		
1254		----		----		
1257		----		----		
1381		----		----		
1544	D156	28.0		-0.20		
1586		----		----		
1603	In house	27		-1.60		
1616	D156	28		-0.20		
1656		----		----		
1669		----		----		
1720		----		----		
1737		----		----		
1776		----		----		
1788		----		----		
1849	TS2991	29		1.20		
1857	D156	27		-1.60	0.5	
1950	D156	27		-1.60		
1960		----		----		

lab	method	value	mark	z(target)	filter	remarks
1967	D156	27		-1.60	0.5	
1995		----				
6026	D156	27		-1.60		
6134		----				
6185	D156	26		-3.00		
6198		----				
6200		----				
6229		----				
6238		----				
6299		----				
7009		----				
9008		----				
normality		OK				
n		28				
outliers		0				
mean (n)		28.143				
st.dev. (n)		1.1455				
R(calc.)		3.207				
st.dev.(D156:15)		0.7143				
R(D156:15)		2				



Determination of Copper Corrosion 3 hrs at 50 °C on sample #23040

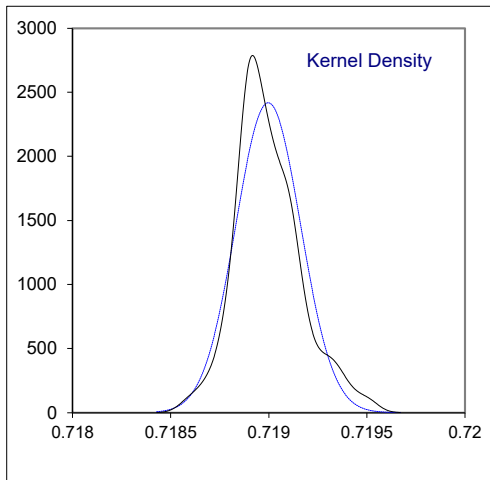
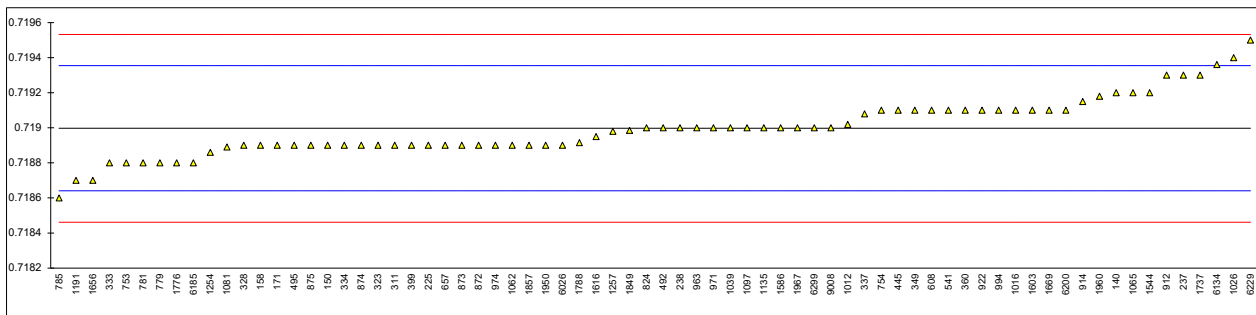
lab	method	value	mark	z(targ)	remarks
140		----		----	
150	D130	1a		----	
158	D130	1a		----	
171	D130	1a		----	
225	D130	1a		----	
231		----		----	
237	D130	1A		----	
238	D130	1a		----	
311	D130	1A		----	
323		----		----	
328	D130	1		----	
333		----		----	
334	ISO2160	1		----	
337		----		----	
349		----		----	
360	D130	1A		----	
399	D130	1a		----	
444		----		----	
445	D130	1a		----	
492		----		----	
495		----		----	
541	D130	1a		----	
608		----		----	
657	D130	1a		----	
750		----		----	
753	ISO2160	1a		----	
754	D130	1a		----	
779	D130	1a		----	
781	D130	1a		----	
785	D130	1a		----	
798		----		----	
824	D130	1A		----	
855		----		----	
862		----		----	
868		----		----	
872		----		----	
873	D130	1a		----	
874	D130	1a		----	
875	D130	1a		----	
876		----		----	
912		1A		----	
914	D130	1a		----	
922	D130	1a		----	
963	D130	1a		----	
971	D130	1a		----	
974	D130	1a		----	
982		----		----	
994	D130	1a		----	
1012		----		----	
1016	D130	1a		----	
1026	ISO2160	1A		----	
1039		----		----	
1062	D130	1A		----	
1065		----		----	
1081		----		----	
1097	ISO2160	1a		----	
1135	D130	1A		----	
1191	ISO2160	1a		----	
1254	D130	1a		----	
1257		----		----	
1381	ISO2160	1a		----	
1544	D130	1A		----	
1586	IP154	1A		----	
1603	In house	1A		----	
1616	D130	1a		----	
1656	IP154	1		----	
1669	D130	1a		----	
1720		----		----	
1737		----		----	
1776		----		----	
1788	D130	1a		----	
1849	ISO2160	1A		----	
1857	D130	1a		----	
1950	D130	1a		----	
1960		----		----	

lab	method	value	mark	z(targ)	remarks
1967	D130	1A		----	
1995		----		----	
6026	D130	1a		----	
6134		----		----	
6185	D130	1A		----	
6198		----		----	
6200		----		----	
6229		----		----	
6238		----		----	
6299	ISO2160	1a		----	
7009		----		----	
9008	D130	1A		----	
	n	53			
	mean (n)	1 (1a)			

Determination of Density at 15 °C on sample #23040; results in kg/L

lab	method	value	mark	z(targ)	remarks
140	D4052	0.7192		1.14	
150	D4052	0.7189		-0.54	
158	D4052	0.7189		-0.54	
171	D4052	0.7189		-0.54	
225	D4052	0.7189		-0.54	
231		----		----	
237	D4052	0.7193		1.70	
238	D4052	0.7190		0.02	
311	D4052	0.7189		-0.54	
323	D4052	0.7189		-0.54	
328	ISO12185	0.7189		-0.54	
333	ISO12185	0.7188		-1.10	
334	ISO12185	0.7189		-0.54	
337	ISO12185	0.71908		0.46	
349	D4052	0.7191		0.58	
360	D4052	0.7191		0.58	
399	D4052	0.7189		-0.54	
444		----		----	
445	ISO12185	0.7191		0.58	
492	D4052	0.7190		0.02	
495	ISO12185	0.7189		-0.54	
541	D4052	0.7191		0.58	
608	D4052	0.7191		0.58	
657	ISO12185	0.7189		-0.54	
750		----		----	
753	ISO12185	0.7188		-1.10	
754	D4052	0.7191		0.58	
779	D4052	0.7188		-1.10	
781	ISO12185	0.7188		-1.10	
785	ISO12185	0.7186		-2.22	
798		----		----	
824	ISO12185	0.7190		0.02	
855		----		----	
862		----		----	
868		----		----	
872	ISO12185	0.7189		-0.54	
873	ISO12185	0.7189		-0.54	
874	ISO12185	0.7189		-0.54	
875	ISO12185	0.7189		-0.54	
876		----		----	
912	ISO12185	0.7193		1.70	
914	D4052	0.71915		0.86	
922	D4052	0.7191		0.58	
963	ISO12185	0.7190		0.02	
971	D4052	0.7190		0.02	
974	D4052	0.7189		-0.54	
982		----		----	
994	D4052	0.7191		0.58	
1012	D4052	0.71902		0.13	
1016	D4052	0.7191		0.58	
1026	D4052	0.7194		2.26	
1039	ISO12185	0.7190		0.02	
1062	D4052	0.7189		-0.54	
1065	D4052	0.7192		1.14	
1081	D4052	0.71889		-0.60	
1097	ISO12185	0.71900		0.02	
1135	ISO12185	0.7190		0.02	
1191	ISO12185	0.7187		-1.66	
1254	D4052	0.71886		-0.77	
1257	D4052	0.71898		-0.10	
1381		----		----	
1544	ISO12185	0.71920		1.14	
1586	ISO12185	0.7190		0.02	
1603	In house	0.7191		0.58	
1616	D4052	0.71895		-0.26	
1656	ISO12185	0.7187		-1.66	
1669	D4052	0.7191		0.58	
1720		----		----	
1737		0.7193		1.70	
1776	ISO12185	0.7188		-1.10	
1788	D4052	0.718915		-0.46	
1849	ISO12185	0.718985		-0.07	
1857	ISO12185	0.7189		-0.54	
1950	D4052	0.7189		-0.54	
1960	D4052	0.71918		1.02	

lab	method	value	mark	z(targ)	remarks
1967	D1298	0.7190		0.02	
1995		----		----	
6026	D4052	0.7189		-0.54	
6134	D4052	0.71936		2.03	
6185	D4052	0.7188		-1.10	
6198		----		----	
6200	ISO12185	0.7191		0.58	
6229	D7042	0.7195		2.82	
6238		----		----	
6299	ISO12185	0.71900		0.02	
7009		----		----	
9008	D4052	0.7190		0.02	
normality		OK			
n		72			
outliers		0			
mean (n)		0.71900			
st.dev. (n)		0.000165			
R(calc.)		0.00046			
st.dev.(ISO12185:96)		0.000179			
R(ISO12185:96)		0.0005			

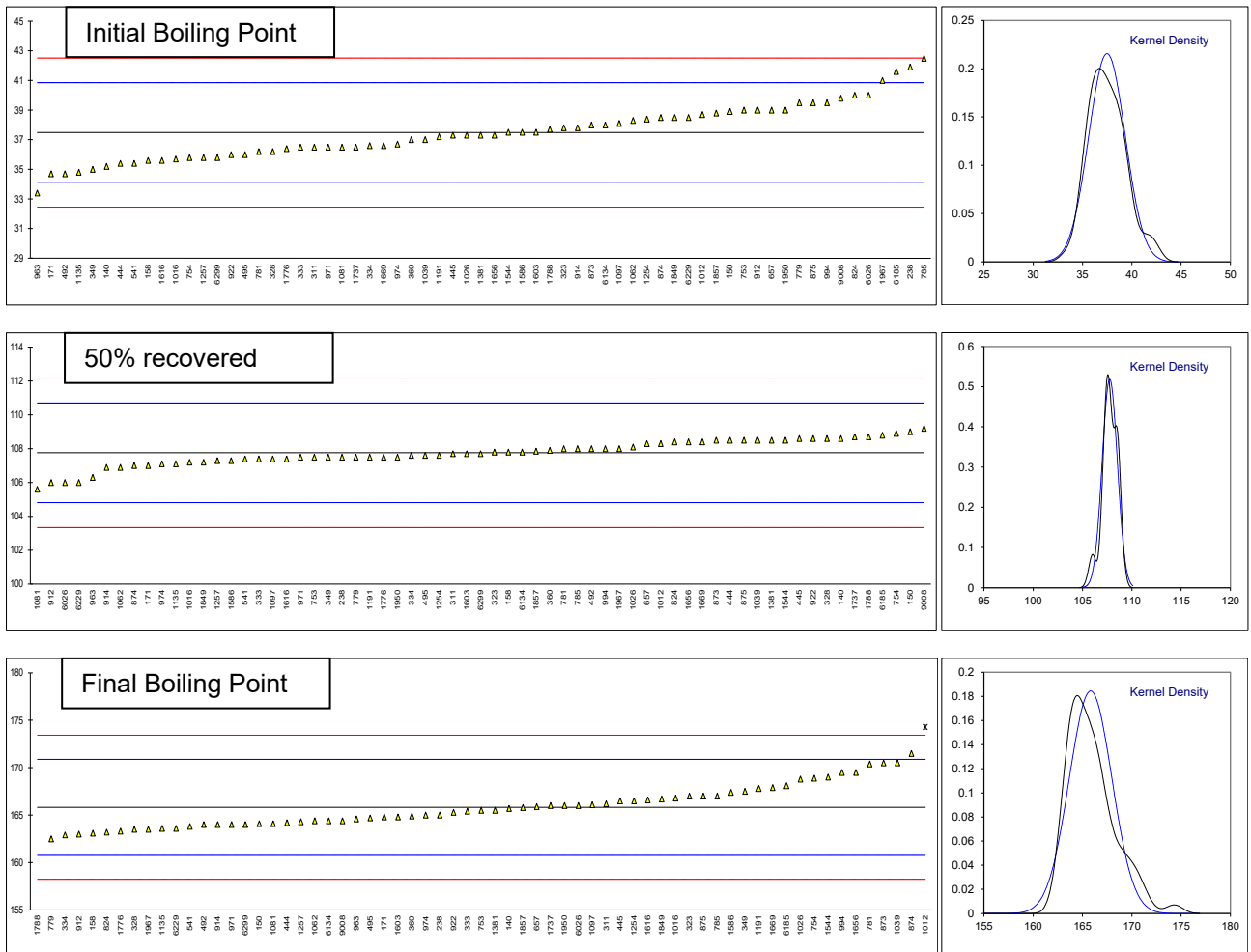


Determination of Distillation at 760 mmHg on sample #23040; results in °C

lab	method	IBP	mark	z(targ)	50% rec.	mark	z(targ)	FBP	mark	z(targ)
140	D86-automated	35.2		-1.36	108.6		0.57	165.7		-0.05
150	D86-automated	38.9		0.85	109.0		0.85	164.1		-0.68
158	D86-automated	35.6		-1.12	107.8		0.03	163.1		-1.07
171	D86-automated	34.7		-1.66	107.0		-0.51	164.8		-0.40
225		----		----	----		----	----		----
231		----		----	----		----	----		----
237		----		----	----		----	----		----
238	D86-manual	41.9		2.63	107.5		-0.17	165.0		-0.32
311	D86-automated	36.5		-0.58	107.7		-0.04	166.2		0.15
323	D86-automated	37.8		0.19	107.8		0.03	167.0		0.47
328	D86-automated	36.2		-0.76	108.6		0.57	163.5		-0.91
333	D86-automated	36.5		-0.58	107.4		-0.24	165.4		-0.16
334	D86-automated	36.6		-0.53	107.6		-0.11	162.9		-1.15
337		----		----	----		----	----		----
349	D86-automated	35		-1.48	107.5		-0.17	167.5		0.66
360	D86-automated	37.0		-0.29	107.9		0.10	164.9		-0.36
399		----		----	----		----	----		----
444	D86-automated	35.4		-1.24	108.5		0.51	164.2		-0.64
445	D86-automated	37.3		-0.11	108.6		0.57	166.5		0.27
492		34.7		-1.66	108.0		0.17	164.0		-0.72
495	D86-automated	36.0		-0.88	107.6		-0.11	164.7		-0.44
541	D86-automated	35.4		-1.24	107.4		-0.24	163.8		-0.80
608		----		----	----		----	----		----
657	D86-automated	39.0		0.90	108.3		0.37	165.9		0.03
750		----		----	----		----	----		----
753	D86-manual	39.0		0.90	107.5		-0.17	165.5		-0.13
754	D86-automated	35.8		-1.00	108.9		0.78	168.9		1.22
779	D86-manual	39.5		1.20	107.5		-0.17	162.5		-1.31
781	D86-automated	36.2		-0.76	108.0		0.17	170.4		1.81
785	D86-manual	42.5		2.99	108.0		0.17	167.0		0.47
798		----		----	----		----	----		----
824	D86-automated	40.0		1.50	108.4		0.44	163.2		-1.03
855		----		----	----		----	----		----
862		----		----	----		----	----		----
868		----		----	----		----	----		----
872		----		----	----		----	----		----
873	D86-manual	38.0		0.31	108.5		0.51	170.5		1.85
874	D86-manual	38.5		0.61	107.0		-0.51	171.5		2.24
875	D86-manual	39.5		1.20	108.5		0.51	167.0		0.47
876		----		----	----		----	----		----
912	D86	39.0		0.90	106.0		-1.19	163.0		-1.11
914	D86-automated	37.8		0.19	106.9		-0.58	164.0		-0.72
922	D86-automated	36.0		-0.88	108.6		0.57	165.3		-0.20
963	D86-automated	33.4		-2.43	106.3		-0.99	164.6		-0.48
971	D86-automated	36.5		-0.58	107.5		-0.17	164.0		-0.72
974	D86-automated	36.7		-0.47	107.1		-0.45	165.0		-0.32
982		----		----	----		----	----		----
994	D86-manual	39.5		1.20	108.0		0.17	169.5		1.45
1012		38.7		0.73	108.3		0.37	174.3	R(0.05)	3.35
1016	D86-automated	35.7		-1.06	107.2		-0.38	166.8		0.39
1026	D86-automated	37.3		-0.11	108.1		0.23	168.8		1.18
1039	ISO3405-automated	37.0		-0.29	108.5		0.51	170.5		1.85
1062		38.3		0.49	106.9		-0.58	164.4		-0.56
1065		----		----	----		----	----		----
1081		36.5		-0.58	105.6		-1.47	164.1		-0.68
1097	ISO3405-automated	38.1		0.37	107.4		-0.24	166.1		0.11
1135	D86-automated	34.8		-1.60	107.1		-0.45	163.6		-0.87
1191	ISO3405-automated	37.2		-0.17	107.5		-0.17	167.8		0.78
1254	D86-automated	38.4		0.55	107.6		-0.11	166.5		0.27
1257	D86-automated	35.8		-1.00	107.3		-0.31	164.3		-0.60
1381		37.3		-0.11	108.5		0.51	165.5		-0.13
1544	D86-manual	37.50		0.01	108.50		0.51	169.00		1.26
1586	ISO3405-automated	37.5		0.01	107.3		-0.31	167.4		0.62
1603	D86-automated	37.5		0.01	107.7		-0.04	164.8		-0.40
1616	D86-automated	35.6		-1.12	107.4		-0.24	166.6		0.31
1656	IP123-automated	37.3		-0.11	108.4		0.44	169.5		1.45
1669	D86-automated	36.6		-0.53	108.4		0.44	167.9		0.82
1720		----		----	----		----	----		----
1737		36.5		-0.58	108.7		0.64	166.0		0.07
1776	ISO3405-automated	36.4		-0.64	107.5		-0.17	163.3		-0.99
1788	D86-automated	37.7		0.13	108.7		0.64	108.4	R(0.01)	-22.64
1849	ISO3405-automated	38.5		0.61	107.2		-0.38	166.7		0.35
1857	D86-automated	38.8		0.79	107.85		0.06	165.8		-0.01
1950	D86-manual	39.0		0.90	107.5		-0.17	166.0		0.07
1960		----		----	----		----	----		----

lab	method	IBP	mark	z(targ)	50% rec.	mark	z(targ)	FBP	mark	z(targ)
1967	D86-manual	41.0		2.10	108.0		0.17	163.5		-0.91
1995		----		----			----			----
6026	D86-manual	40.0		1.50	106.0		-1.19	166.0		0.07
6134	D86-automated	38.0		0.31	107.8		0.03	164.4		-0.56
6185	D86-automated	41.6	C	2.45	108.8		0.71	168.1		0.90
6198		----		----			----			----
6200		----		----			----			----
6229		38.5		0.61	106.0		-1.19	163.6		-0.87
6238		----		----			----			----
6299	ISO3405-automated	35.8		-1.00	107.7		-0.04	164.0		-0.72
7009		----		----			----			----
9008	D2887-automated	39.8		1.38	109.2		0.98	164.4		-0.56
normality		OK			OK			OK		
n		65			65			63		
outliers		0			0			2		
mean (n)		37.48			107.76			165.82		
st.dev. (n)		1.851			0.770			2.162		
R(calc.)		5.18			2.15			6.05		
st.dev.(D86-A:23)		1.679			1.470			2.536		
R(D86-A:23)		4.7			4.12			7.1		
Compare:										
R(D86-M:23)		5.6			4.23			7.2		

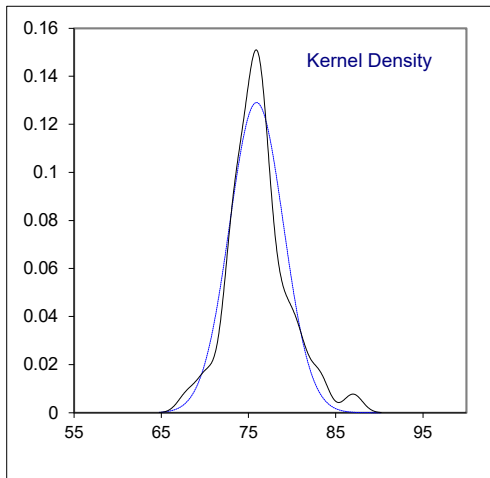
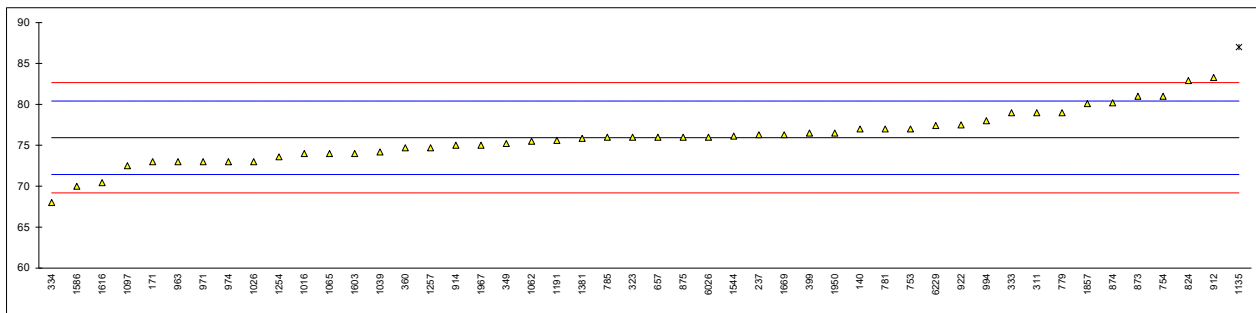
Lab 6185 first reported 43.4



Determination of Mercaptan Sulfur as S on sample #23040; results in mg/kg

lab	method	value	mark	z(targ)	remarks
140	D3227	77		0.48	
150		----		----	
158		----		----	
171	D3227	73		-1.30	
225		----		----	
231		----		----	
237	D3227	76.3		0.17	
238		----		----	
311	UOP163	79.0		1.37	
323	D3227	76		0.03	
328		----		----	
333	D3227	79		1.37	
334	D3227	68		-3.53	
337		----		----	
349	UOP163	75.21		-0.32	
360	D3227	74.7		-0.55	
399	D3227	76.50		0.26	
444		----		----	
445		----		----	
492		----		----	
495		----		----	
541		----		----	
608		----		----	
657	D3227	76		0.03	
750		----		----	
753	UOP163	77		0.48	
754	UOP163	81		2.26	
779	UOP163	79		1.37	
781	D3227	77		0.48	
785	UOP163	76		0.03	
798		----		----	
824	D3227	82.9		3.11	
855		----		----	
862		----		----	
868		----		----	
872		----		----	
873	D3227	81		2.26	
874	UOP163	80.2		1.90	
875	UOP163	76		0.03	
876		----		----	
912	D3227	83.3		3.28	
914	D3227	75		-0.41	
922	D3227	77.5		0.70	
963	D3227	73		-1.30	
971	D3227	73		-1.30	
974	D3227	73		-1.30	
982		----		----	
994	D3227	78.0		0.92	
1012		----		----	
1016	D3227	74		-0.86	
1026	D3227	73		-1.30	
1039	UOP163	74.2		-0.77	
1062	D3227	75.5		-0.19	
1065	D3227	74		-0.86	
1081		----		----	
1097	ISO3012	72.5		-1.52	
1135	D3227	87	R(0.05)	4.93	
1191	UOP163	75.6		-0.14	
1254	D3227	73.6		-1.04	
1257	D3227	74.71		-0.54	
1381	UOP163	75.86		-0.03	
1544	D3227	76.14		0.10	
1586	D3227	70		-2.64	
1603	In house	74		-0.86	
1616	D3227	70.43		-2.45	
1656		----		----	
1669	UOP163	76.3		0.17	
1720		----		----	
1737		----		----	
1776		----		----	
1788		----		----	
1849		----		----	
1857	UOP163	80.1		1.86	
1950	D3227	76.5		0.26	
1960		----		----	

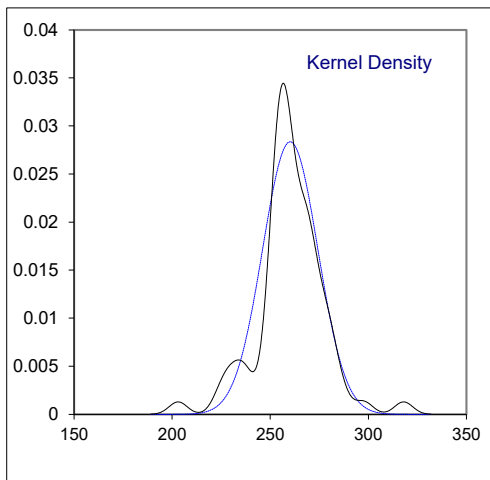
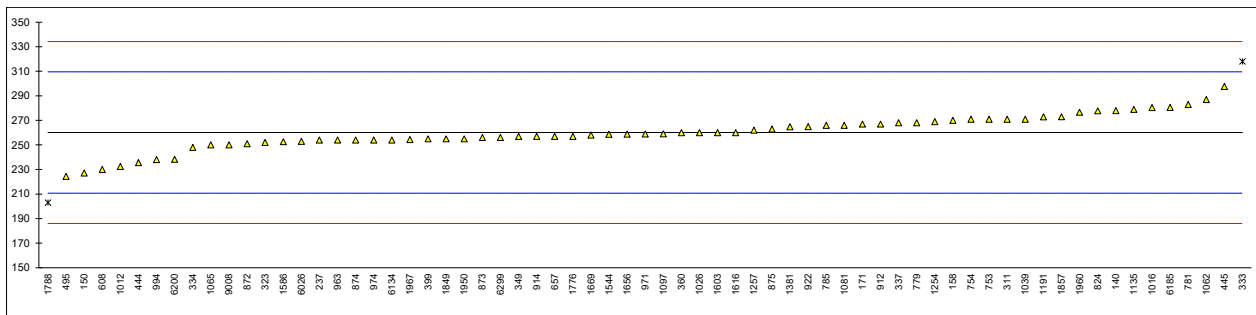
lab	method	value	mark	z(target)	remarks
1967	GOST17323	75.0		-0.41	
1995		----		----	
6026	UOP163	76		0.03	
6134		----		----	
6185		----		----	
6198		----		----	
6200		----		----	
6229	UOP163	77.43		0.67	
6238		----		----	
6299		----		----	
7009		----		----	
9008		----		----	
normality		OK			
n		47			
outliers		1			
mean (n)		75.925			
st.dev. (n)		3.0919			
R(calc.)		8.657			
st.dev.(D3227:16)		2.2460			
R(D3227:16)		6.289			



Determination of Sulfur on sample #23040; results in mg/kg

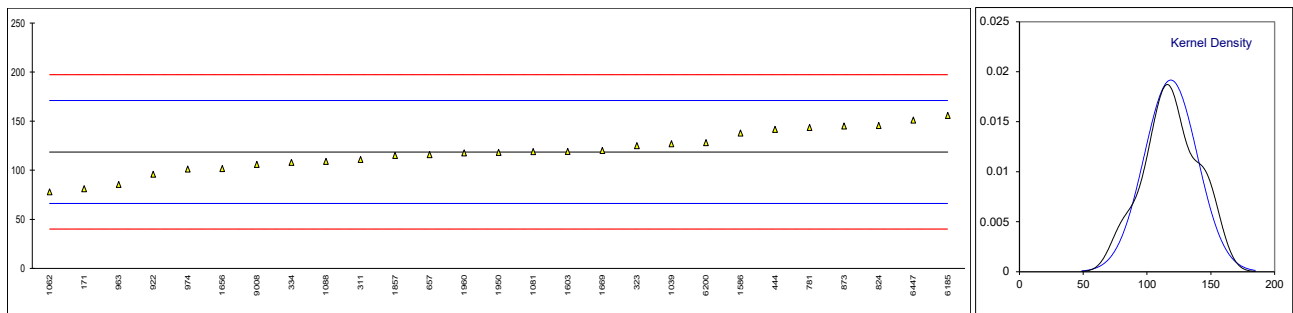
lab	method	value	mark	z(targ)	remarks
140	D2622	278		0.72	
150	D4294	227.1		-1.34	
158	D2622	270		0.40	
171	D2622	267		0.28	
225		----		----	
231		----		----	
237	D4294	254		-0.25	
238		----		----	
311	D2622	271		0.44	
323	D5453	252		-0.33	
328		----		----	
333	D5453	318	R(0.01)	2.34	
334	D4294	248		-0.49	
337	D5453	268		0.32	
349	D7039	257		-0.13	
360	D4294	260.0		-0.01	
399	D4294	255		-0.21	
444	D5453	235.54	C	-1.00	first reported 0.3517
445	D4294	297.7		1.52	
492		----		----	
495	D5453	224.4		-1.45	
541		----		----	
608	D5453	230		-1.22	
657	D4294	257		-0.13	
750		----		----	
753	D4294	271		0.44	
754	D4294	271		0.44	
779	D4294	268		0.32	
781	D4294	283		0.92	
785	D4294	266		0.24	
798		----		----	
824	D5453	277.8		0.71	
855		----		----	
862		----		----	
868		----		----	
872	D4294	251		-0.37	
873	D4294	256		-0.17	
874	D4294	254		-0.25	
875	D4294	263		0.11	
876		----		----	
912	D5453	267		0.28	
914	D4294	257		-0.13	
922	D4294	265		0.20	
963	D4294	254		-0.25	
971	D4294	259		-0.05	
974	D4294	254		-0.25	
982		----		----	
994	D4294	238		-0.90	
1012	D5453	232.553		-1.12	
1016	D2622	280.5		0.82	
1026	D2622	260		-0.01	
1039	D2622	271		0.44	
1062	D4294	287		1.09	
1065	D4294	250		-0.41	
1081	D2622	266.0		0.24	
1097	D5453	259.07		-0.04	
1135	D4294	279		0.76	
1191	ISO8754	272.8		0.51	
1254	D4294	269		0.36	
1257	D4294	262		0.07	
1381	ISO8754	264.80		0.19	
1544	D4294	258.8		-0.06	
1586	ISO8754	252.6		-0.31	
1603	In house	260		-0.01	
1616	D4294	260		-0.01	
1656	IP336	258.9		-0.05	
1669	D4294	258		-0.09	
1720		----		----	
1737		----		----	
1776	D5453	257		-0.13	
1788	D5453	203.01	R(0.01)	-2.31	
1849	ISO8754	255		-0.21	
1857	D4294	273		0.52	
1950	D4294	255.0		-0.21	
1960	D5453	276.640		0.67	

lab	method	value	mark	z(targ)	remarks
1967	D4294	254.4		-0.23	
1995		-----		-----	
6026	D4294	253		-0.29	
6134	D5453	254		-0.25	
6185	D5453	280.6		0.83	
6198		-----		-----	
6200	D5453	238.27		-0.89	
6229		-----		-----	
6238		-----		-----	
6299	D5453	256		-0.17	
7009		-----		-----	
9008	D5453	250		-0.41	
normality		OK			
n		65			
outliers		2			
mean (n)		260.176			
st.dev. (n)		14.0705			
R(calc.)		39.397			
st.dev.(D4294:21)		24.6955			
R(D4294:21)		69.147			
Compare:					
R(D2622:21)		36.861			
R(D5453:19a)		37.554			



Determination of Mercury as Hg on sample #23041; results in µg/kg

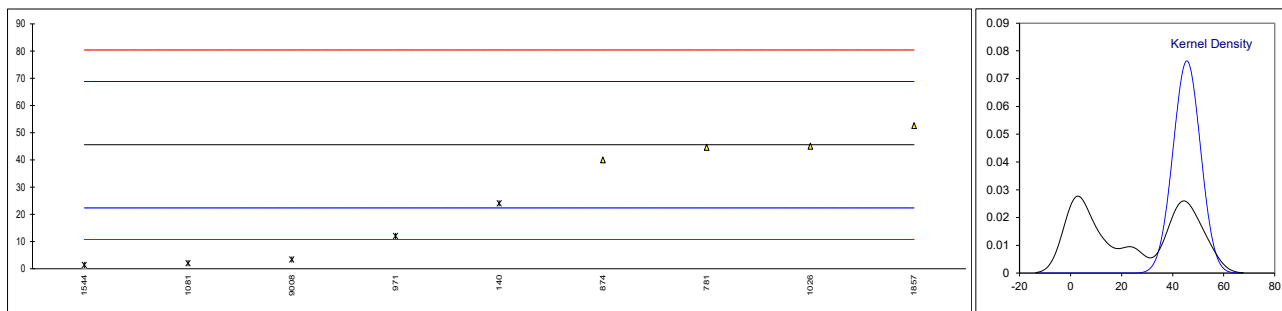
lab	method	value	mark	z(targ)	remarks
140		----		----	
171	UOP938	81.3		-1.43	
311	UOP938	111		-0.29	
323	UOP938	125		0.24	
333	INH-09003	>100		----	
334	INH-09003	108		-0.41	
349		----		----	
444	UOP938	141.664		0.88	
657	UOP938	116		-0.10	
750		----		----	
754		----		----	
781	UOP938	143.6		0.95	
798		----		----	
824	UOP938	145.6		1.03	
855		----		----	
862		----		----	
868		----		----	
873	UOP938	145		1.01	
874		----		----	
876		----		----	
912		----		----	
922	UOP938	96		-0.87	
963	UOP938	85.56		-1.26	
974	UOP938	101.2		-0.67	
1026		----		----	
1039	UOP938	127		0.32	
1062		78	C	-1.55	first reported 41
1081	In house	119		0.01	
1088	D6350	109.03		-0.37	
1586	UOP938	138		0.74	
1603	In house	119.2		0.02	
1656	UOP938	101.7		-0.65	
1669	UOP938	120.15		0.06	
1857	UOP938	115.1		-0.14	
1950	UOP938	118.1		-0.02	
1960	UOP938	117.64		-0.04	
1995		----		----	
6185	In house	155.85		1.42	
6200	UOP938	128.067		0.36	
6447	UOP938	151		1.24	
9008	UOP938	105.985		-0.48	
	normality	OK			
	n	27			
	outliers	0			
	mean (n)	118.657			
	st.dev. (n)	20.8216			
	R(calc.)	58.300			
	st.dev.(Horwitz)	26.1666			
	R(Horwitz)	73.266			
Compare:					
	R(UOP938:20)	15.497			



Determination of Arsenic as As on sample #23042; results in µg/kg

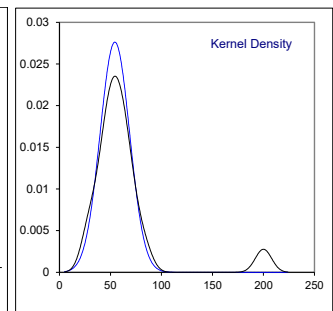
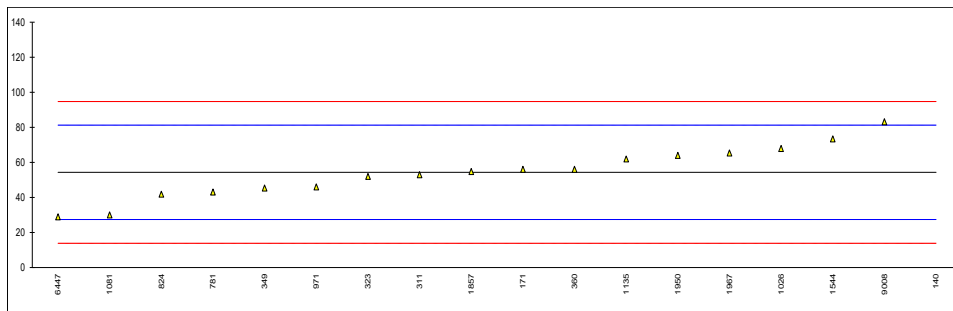
lab	method	value	mark	z(targ)	rinsed with strong acid?	remarks
140	D8110	24	ex	-1.86	No	test result excluded, see §4.1
150		----		----	---	
171	D8110	<5		<-3.50	No	possibly a false negative test result?
237		----		----	---	
311		----		----	---	
323	In house	< 10		<-3.06	No	possibly a false negative test result?
349	INH-9312	<5		<-3.50	No	possibly a false negative test result?
360		----		----	---	
444		----		----	---	
445		----		----	---	
657		----		----	---	
750		----		----	---	
781	UOP946	44.6		-0.08	Yes	
824		----		----	---	
855		----		----	---	
862		----		----	---	
868		----		----	---	
874	UOP946	40.0		-0.48	Yes	
876		----		----	---	
912		----		----	---	
963		----		----	---	
971	UOP946	12	ex	-2.89	No	test result excluded, see §4.1
1026	In house	45		-0.05	Yes	
1081	In house	2	ex	-3.75	No	test result excluded, see §4.1
1135	In house	<5		<-3.50	No	possibly a false negative test result?
1544		1.39	ex	-3.81	---	test result excluded, see §4.1
1603		----		----	---	
1669		<4		<-3.58	No	possibly a false negative test result?
1720		----		----	---	
1857	UOP946	52.6		0.61	Yes	
1950		----		----	---	
1967		----		----	---	
6447	In house	<10		<-3.06	No	possibly a false negative test result?
9008	D8110	3.381667	ex	-3.63	No	test result excluded, see §4.1

normality not OK
n 4
outliers 0 +5ex
mean (n) 45.550
st.dev. (n) 5.2189
R(calc.) 14.613
st.dev.(Horwitz) 11.6018
R(Horwitz) 32.485



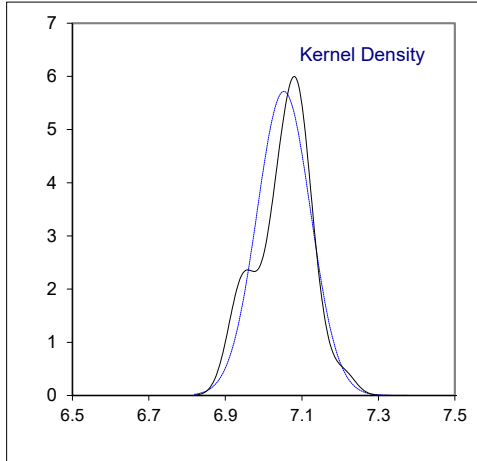
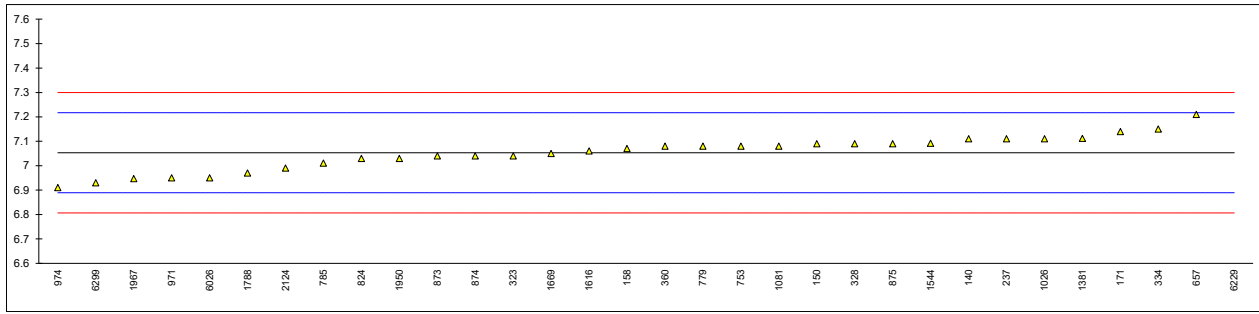
Determination of Lead as Pb on sample #23042; results in µg/kg

lab	method	value	mark	z(targ)	remarks
140	D8110	200	C,G(0.01)	10.82	first reported 101.92
150		----			
171	D8110	56		0.13	
237		----			
311	UOP952	53		-0.10	
323	In house	52		-0.17	
349	UOP952	45.4		-0.66	
360	INH-06	56.01		0.13	
444		----			
445		----			
657		----			
750		----			
781	UOP952	43.1		-0.83	
824	UOP952	41.9		-0.92	
855		----			
862		----			
868		----			
874		----			
876		----			
912		----			
963		----			
971	UOP952	46		-0.62	
1026	In house	68		1.02	
1081	In house	30		-1.80	
1135	UOP952	62		0.57	
1544		73.43		1.42	
1603		----			
1669	UOP952	<1	C	<-3.96	first reported <10, possibly a false negative test result?
1720		----			
1857	UOP952	54.8		0.04	
1950	UOP952	64		0.72	
1967	UOP952	65.4		0.82	
6447	In house	29		-1.88	
9008	D8110	83.17166667		2.14	
	normality	OK			
	n	17			
	outliers	1			
	mean (n)	54.307			
	st.dev. (n)	14.4368			
	R(calc.)	40.423			
	st.dev.(Horwitz)	13.4709			
	R(Horwitz)	37.718			



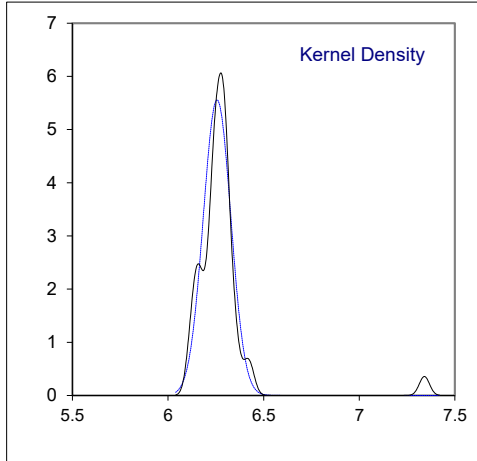
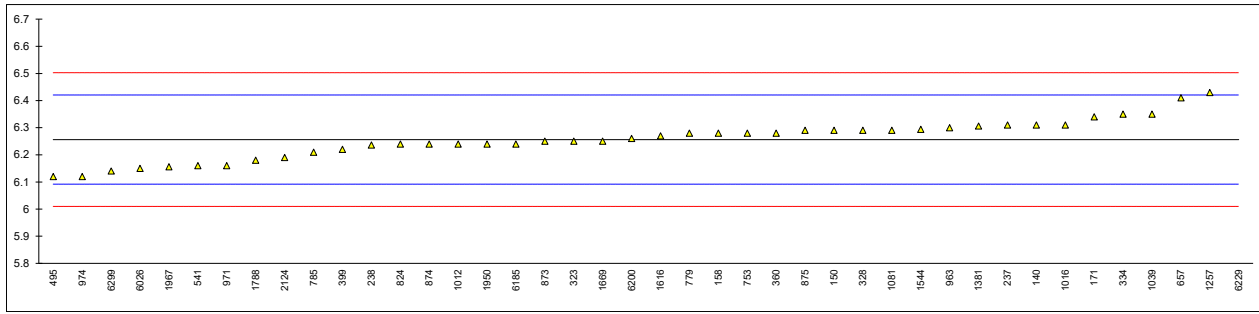
Determination of Total Vapor Pressure on sample #23043; results in psi

lab	method	value	mark	z(targ)	remarks
140	D5191	7.11	C	0.69	first reported 7.39
150	D5191	7.09		0.45	
158	D5191	7.07		0.21	
171	D5191	7.14		1.06	
237	D5191	7.11		0.69	
238		----		----	
323	D5191	7.04		-0.16	
328	D5191	7.09		0.45	
334	EN13016-1	7.15		1.18	
360	D5191	7.08		0.33	
399		----		----	
445		----		----	
495		----		----	
541		----		----	
608		----		----	
657	D5191	7.21		1.91	
750		----		----	
753	EN13016-1	7.08		0.33	
754		----		----	
779	D5191	7.08		0.33	
785	D5191	7.01		-0.52	
798		----		----	
824	D5191	7.03		-0.28	
855		----		----	
862		----		----	
868		----		----	
873	D5191	7.04		-0.16	
874	D5191	7.04		-0.16	
875	D5191	7.09		0.45	
876		----		----	
963		----		----	
971	D5191	6.95		-1.25	
974	D5191	6.91		-1.74	
1012		----		----	
1016		----		----	
1026	D5191	7.11		0.69	
1039		----		----	
1081	D5191	7.08		0.33	
1257		----		----	
1381	EN13016-1	7.112		0.72	
1544	D5191	7.092		0.48	
1616	D5191	7.06		0.09	
1669	D5191	7.05	C	-0.04	first reported 7.64
1720		----		----	
1788	D5191	6.97		-1.01	
1950	D5191	7.03		-0.28	
1967	D5191	6.947		-1.29	
2124	D5191	6.99		-0.77	
6026	D5191	6.95		-1.25	
6134		----		----	
6185		----		----	
6200		----		----	
6229	D5191	8.18	R(0.01)	13.72	
6238		----		----	
6299	EN13016-1	6.93		-1.50	
	normality	OK			
	n	31			
	outliers	1			
	mean (n)	7.053			
	st.dev. (n)	0.0698			
	R(calc.)	0.195			
	st.dev.(D5191:22)	0.0821			
	R(D5191:22)	0.23			



Determination of DVPE acc. to D5191 on sample #23043; results in psi

lab	method	value	mark	z(targ)	remarks
140	D5191	6.31	C	0.65	first reported 6.58
150	D5191	6.29		0.41	
158	D5191	6.28		0.29	
171	D5191	6.34		1.02	
237	D5191	6.31		0.65	
238	D5191	6.236		-0.25	
323	D5191	6.25		-0.08	
328	D5191	6.29		0.41	
334	EN13016-1	6.35		1.14	
360	D5191	6.28		0.29	
399	D5191	6.22		-0.44	
445		----		----	
495	EN13016-1	6.12		-1.66	
541	D6378	6.16		-1.17	
608		----		----	
657	D5191	6.41		1.87	
750		----		----	
753	EN13016-1	6.28		0.29	
754		----		----	
779	D5191	6.28		0.29	
785	D5191	6.21		-0.56	
798		----		----	
824	D5191	6.24		-0.20	
855		----		----	
862		----		----	
868		----		----	
873	D5191	6.25		-0.08	
874	D5191	6.24		-0.20	
875	D5191	6.29		0.41	
876		----		----	
963	D5191	6.3	C	0.53	first reported 6.01
971	D5191	6.16		-1.17	
974	D5191	6.12		-1.66	
1012	D5191	6.24		-0.20	
1016	D5191	6.31		0.65	
1026		----		----	
1039	EN13016-1	6.35		1.14	
1081	D5191	6.29		0.41	
1257	D5191	6.43		2.11	
1381	EN13016-1	6.306		0.60	
1544	D5191	6.294		0.46	
1616	D5191	6.27		0.17	
1669	D5191	6.25	C	-0.08	first reported 6.83
1720		----		----	
1788	D5191	6.18		-0.93	
1950	D5191	6.24		-0.20	
1967	D5191	6.156		-1.22	
2124	D5191	6.19		-0.81	
6026	D5191	6.15		-1.30	
6134		----		----	
6185	D6378	6.24		-0.20	
6200	D5191	6.26		0.04	
6229	D5191	7.34	R(0.01)	13.19	
6238		----		----	
6299	EN13016-1	6.14		-1.42	
	normality	OK			
	n	41			
	outliers	1			
	mean (n)	6.256			
	st.dev. (n)	0.0718			
	R(calc.)	0.201			
	st.dev.(D5191:22)	0.0821			
	R(D5191:22)	0.23			



APPENDIX 2**Number of participants per country**

1 lab in ARGENTINA
3 labs in AUSTRALIA
1 lab in AZERBAIJAN
3 labs in BELGIUM
2 labs in BULGARIA
5 labs in CHINA, People's Republic
1 lab in CONGO Brazzaville
1 lab in COTE D'IVOIRE
1 lab in EGYPT
1 lab in ESTONIA
1 lab in FINLAND
7 labs in FRANCE
3 labs in GERMANY
3 labs in INDIA
2 labs in IRAN, Islamic Republic of
1 lab in ISRAEL
2 labs in ITALY
1 lab in KOREA, Republic of
1 lab in KUWAIT
1 lab in LATVIA
1 lab in LIBERIA
1 lab in MALAYSIA
1 lab in MALTA
6 labs in NETHERLANDS
3 labs in NIGERIA
1 lab in NORWAY
1 lab in PAKISTAN
1 lab in PORTUGAL
1 lab in QATAR
15 labs in RUSSIAN FEDERATION
1 lab in SAUDI ARABIA
1 lab in SINGAPORE
2 labs in SPAIN
1 lab in SUDAN
1 lab in SWEDEN
1 lab in TURKEY
3 labs in UNITED ARAB EMIRATES
4 labs in UNITED KINGDOM
4 labs in UNITED STATES OF AMERICA

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
E	= calculation difference between reported test result and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
fr.	= first reported
f+?	= possibly a false positive test result?
f-?	= possibly a false negative test result?
SDS	= Safety Data Sheet

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