Results of Proficiency Test
Jet Fuel A1
March 2020

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 1995 the Institute for Interlaboratory Studies organizes proficiency tests (PT) for Jet Fuel A1 twice a year. In the annual proficiency testing program of 2019/2020 it was decided to continue the proficiency tests on Jet Fuel A1 and Jet Fuel Particle Size in accordance with the latest version of the "Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS)", sometimes referred to as the "Joint Fuelling System Check List for Jet A-1".

In total 100 laboratories from 52 different countries registered for participation in the interlaboratory study for Jet Fuel A1. From these participants to the regular round, 44 also participated in the interlaboratory study for Particle Size Distribution. See appendix 4 for the number of participants per country.

In this report the results of the Jet Fuel A1 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. Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC17025 accredited laboratory. For the regular round, it was decided to send two liters of Jet Fuel A1 labelled #20020 for the analyses according to the latest version of "Joint Fuelling System Check List for Jet A-1". For the Particle Size Distribution round, it was decided to send one 0.5L of Jet Fuel A1, labelled #20021.
The participants were requested to report rounded and unrounded test results.
The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

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

2.2 PROTOCOL

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

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

For the first sample a batch of approximately 300 liters Jet Fuel A1 was obtained from a local refinery. After homogenization in a mixing vessel 242 amber glass bottles of one liter were filled and closed with inner and outer caps and labelled #20020.
The homogeneity of the subsamples was checked by the determination of Density at 15°C in accordance with ASTM D4052 on ten stratified randomly selected subsamples.

	Density at 15°C in kg/m^3
Sample #20020-1	793.42
Sample #20020-2	793.41
Sample #20020-3	793.43
Sample #20020-4	793.43
Sample #20020-5	793.43
Sample #20020-6	793.43
Sample #20020-7	793.42
Sample #20020-8	793.43
Sample #20020-9	793.43
Sample #20020-10	793.43

Table 1: homogeneity test results of subsamples #20020

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/m^3
r (observed)	0.02
reference test method	ASTM D4052:18a
0.3 x R (reference test method)	0.15

Table 2: evaluation of the repeatability of subsamples #20020

The calculated repeatability was in agreement with 0.3 times the reproducibility of the reference test method. Therefore, homogeneity of the subsamples #20020 was assumed.

For the second sample a batch of approximately 50 liters Jet Fuel A1 was obtained from a local refinery. After homogenization in a mixing vessel 55 amber glass bottles of 0.5 liter were filled, closed with inner and outer caps, and labelled #20021. Each bottle was spiked with 1 mL of Lube oil which contained Arizona Dust A2.
The homogeneity of the subsamples was checked by the determination of Particle Size Distribution in accordance with IP565 on five stratified randomly selected subsamples.

	> 4 µm (c) counts/mL	> 6 µm (c) counts/mL	> 14 µm (c) counts/mL
Sample #20021-1	13337	3734	116
Sample #20021-2	13374	3744	108
Sample #20021-3	13527	3761	107
Sample #20021-4	13299	3709	104
Sample #20021-5	13391	3712	95

Table 3: homogeneity test results of subsamples #20021

From the above test results the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities of the reference test method in agreement with the procedure of ISO13528, Annex B2 in the next table.

	> 4 µm (c) counts/mL	> 6 µm (c) counts/mL	> 14 µm (c) counts/mL
r (observed)	243	61	21
reference test method	IP565:13	IP565:13	IP565:13
0.3 x R (reference test method)	460	253	20

Table 4: evaluation of repeatabilities of subsamples #20021

The calculated repeatabilities were in agreement with 0.3 times the corresponding reproducibilities of the reference test method. Therefore, homogeneity of the subsamples #20021 was assumed.

Depending on the registration of the participant the appropriate set of PT samples was sent on February 19, 2020. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Jet Fuel A1 packed in the amber glass bottles was checked. The type of bottle was chosen in accordance with ASTM D4306:15. The material has been found sufficiently stable for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #20020: Visual Appearance, Total Acidity, Aromatics by FIA, Mono Aromatics (MAH), Di Aromatics (DAH), Total Aromatics by HPLC (in %M/M and %V/V), Color Saybolt (automated and manual), Copper Corrosion (2 hrs at 100°C), Density at 15°C, Distillation at 760 mmHg (IBP, temperature at 10%, 50%, 90% recovered and FBP), Existent Gum (unwashed), Flash Point, Freezing Point, Kinematic Viscosity at -20°C, Mercaptan Sulfur as S, MSEP, Naphthalenes, Smoke Point, Specific Energy (Net) on Sulfur free basis and Total Sulfur.
The participants were requested to determine Particle Size Distribution only on sample #20021. It was requested to report analytical details of the model of the Particle Size equipment.

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 appropriate 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 original test results are placed under 'Remarks' in the test result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

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

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

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

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

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

3.2 GRAPHICS

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

Furthermore, Kernel Density Graphs were made. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms. Also, a normal Gauss curve was projected over the Kernel Density Graph for reference.

3.3 Z-SCORES

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

The target standard deviation was calculated from the literature reproducibility by division with 2.8. In case no literature reproducibility was available, other targets 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:

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

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

During the execution of this proficiency test some problems occurred with the dispatch of the samples. Seven laboratories informed iis that they were not able to report test results due to the measures taken to contain the Covid-19 pandemic in their countries. Three other laboratories did not report any test results at all.

Finally, 90 participants reported in total 1666 numerical test results. Observed were 67 outlying test results, which is 4.0% of the reported 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.

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 where possible and applicable. These test methods are also in the tables together with the reported test results. The abbreviations, used in these tables, are explained in appendix 5.

In the iis PT reports ASTM test methods are referred to with a number and if appropriate an indication of sub test method (e.g. D1840-B) and an added designation for the year that the test method was adopted or revised (e.g. D1840-B:07). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g. D1840-B:07(2017)). In the test results tables of appendix 1 only the method number (sub) and year of adoption or revision e.g. D1840-B:07 will be used.

Since the Joint Fuelling System Check List for Jet-A1 is continuously updated, the participants are advised to monitor the updates. The latest version at the time of this Round Robin is DEF STAN 91-091/Issue 11, dated: October 2019" and ASTM D1655:20. One must keep in mind that ISO test methods are not mentioned in the "Checklist".

Sample #20020

Visual Appearance: This determination was not problematic. Almost all participants agreed about the appearance of the sample, which was Clear and Bright.

Total Acidity: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D3242:11(2017).

Aromatics by FIA: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with requirements of ASTM D1319:19.

Mono Aromatics by HPLC: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D6379:11(2019).

Di Aromatics by HPLC: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D6379:11(2019).

Total Aromatics by HPLC: The determination in %M/M was not problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in agreement with ASTM D6379:11(2019).
The determination in %V/V may be problematic. One statistical outlier was observed. Regretfully, no precision data for the determination in %V/V is mentioned in ASTM D6379:11(2019). The calculated reproducibility was

higher than the calculated reproducibilities in %V/V of the proficiency tests iis19J01 and iis19J02.

Color Saybolt: The determination was problematic for the automatic test method. Seven statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D6045:12(2017).
The determination for the manual test method was also problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D156:15.

Copper Corrosion: This determination was not problematic. All reporting participants agreed on a test result of 1 (1a/1b).

Density: This determination was not problematic. Six statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D4052:18a.

Distillation at 760 mmHg: This determination was not problematic. In total, nine statistical outliers were observed. All calculated reproducibilities after rejection of the statistical outliers are in agreement with the automated mode requirements of ASTM D86:19.
When compared to the manual mode requirements of ASTM D86:19 only the calculated reproducibilities for IBP is not in agreement.

Existent Gum (unwashed): This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D381:19.

Flash Point: 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 IP170:14.

Freezing Point: This determination was not problematic. Four statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D2386:19.

Kin. Viscosity at -20°C: This determination was not problematic. Five statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D445:19a.

Mercaptan Sulfur: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D3227:16.

MSEP: This determination was not problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D3948:14.

Naphthalenes: This determination may be problematic depending on the procedure used. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ASTM D1840:07(2017) procedure B but not with the stricter requirements of procedure A. When evaluated separately the calculated reproducibility for procedure B is in agreement with the requirements of the procedure B of ASTM D1840:07(2017). The calculated reproducibility for procedure A is stil not in agreement with the stricter requirements of procedure A.

Smoke Point: This determination may be problematic depending on test mode used. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of the manual mode of ASTM D1322:19, but not with the stricter requirements of the automated mode.

Specific Energy: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D3338:09e2(2014). No calculation errors are observed.

Total Sulfur: This determination was problematic. Three statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D5453:19.

Sample #20021

Particle Size Distribution Determination:

The Joint Fuelling System Check List for Jet-A1 lists test methods IP564, IP565 and IP577 as the reference test methods to determine the Particle Size Distribution in Jet Fuel A1. Over the last few years, iis has observed and concluded that these methods are biased and not as interchangeable as it appears from the checklist. Although no equipment suppliers are mentioned in the test methods, the brand of the automatic particle counter (APC) defines the test method. Therefore, the automatic particle counter (APC) in method IP564 is Parker Hannifin, in method IP565 it is Stanhope-Seta and in method IP IP577 it is Pamas.
The participants were requested to specify the brand of the particle counter, along with the method for calibration, the actual test method performed and the test method used for determining ISO code scaling. Almost all reporting participants mentioned the equipment used, five participants used IP564, twenty-six used IP565, one participant used IP577and one participant used ASTM D7647 which is not mentioned in the Checklist as test method. All participants reported to have used the method that corresponds with the equipment used.

Most participants used ISO11171 for the calibration. All laboratories used ISO4406 for calculating the scale numbers from the counts per ml. Almost all participants calculated the ISO code from the test results in counts/ml correctly.

Again, it was found that the test results of IP564 were significantly lower than those of IP565. This is generally the case, the same is also documented in an article found on internet (see literature reference 4). Therefore, it was decided to evaluate both methods separately. The results of the participants performing IP577 were evaluated in the group of IP565, because the results were more compatible with the results of IP565 than those of IP564 at the particle size distribution found in this PT sample.

At the end of September 2019, the Energy Institute announced that it has suspended test method IP564. For this report, IP564 was evaluated, but in the future this method might not be accepted for testing particle size in Jet Fuel.

Five laboratories had two or more outliers for the six different particle sizes in counts/ml or ISO scale numbers. The other test results in counts/ml or ISO scale numbers for these laboratories were excluded.

IP564: The determination according to IP564 was not problematic. In total two statistical outliers were observed and four other test results were excluded for the six particle size categories. Almost all calculated reproducibilities after rejection of the suspect data are in agreement with the requirements of IP564:13 except for ≥14 µm (c).
The determination expressed in ISO scale numbers was not problematic. No statistical outliers were observed but three test results were excluded. The calculated reproducibilities after rejection of the suspect data are in agreement with the indicative requirements of IP564:13 Annex C.

IP565: The determination according to IP565 was problematic. In total twenty-two statistical outliers were observed and eleven other test results were excluded for the six particle size categories. The calculated reproducibilities after rejection of the suspect data are not in agreement with the requirements of IP565:13.
The determination expressed in ISO scale numbers was not problematic. Four statistical outliers were observed and thirteen other test results were excluded. The calculated reproducibilities after rejection of the suspect data are in agreement with the indicative requirements of IP565:13 Annex C.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Parameter	unit	n	average	2.8 * sd	R (lit)
Visual Appearance		64	C&B	n.a.	n.a.
Total Acidity	mg KOH/g	47	0.0020	0.0027	0.0018
Aromatics by FIA	%V/V	32	16.85	2.33	2.81
Mono Aromatics by HPLC	%M/M	17	19.06	1.28	1.86
Di Aromatics by HPLC	%M/M	19	1.28	0.71	0.56
Total Aromatics by HPLC	%M/M	21	20.15	1.99	2.06
Total Aromatics by HPLC	%V/V	33	17.63	1.95	n.a.
Color Saybolt (automated)		39	18.6	1.8	1.2
Color Saybolt (manual)		38	18.1	3.1	2
Copper Corrosion 2hrs at 100°C		75	1 (1a/1b)	n.a.	n.a.
Density at 15°C	kg/m^3	84	793.41	0.23	0.5
Initial Boiling Point	°C	84	150.1	5.1	8.3
Temp at 10% recovered	°C	85	168.6	2.7	3.7
Temp at 50% recovered	°C	85	193.8	1.9	3.0
Temp at 90% recovered	°C	86	234.9	3.6	3.5
Final Boiling Point	°C	86	262.1	4.5	7.1
Existent Gum (unwashed)	mg/100mL	45	0.86	1.48	3.18
Flash Point	°C	80	42.1	2.6	3.2
Freezing Point	°C	67	-54.6	1.7	2.5
Kinematic Viscosity at -20°C	mm^2/s	47	3.608	0.073	0.069
Mercaptan Sulfur as S	%M/M	51	0.00070	0.00024	0.00034
MSEP		57	93.3	9.3	9.4
Naphthalenes	%V/V	39	0.776	0.069	0.081
Smoke Point	mm	59	24.6	1.9	3.8
Specific Energy (Net)	MJ/kg	48	43.327	0.075	0.046
Total Sulfur	mg/kg	71	1143.1	158.1	114.0

Table 5: reproducibilities of tests on sample #20020

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

Parameter - IP564	unit	n	average	2.8 * sd	R (lit)
Particle Size ≥4 µm (c)	counts/mL	5	9064	627	1800
Particle Size ≥6 µm (c)	counts/mL	5	2809	587	894
Particle Size ≥14 µm (c)	counts/mL	5	54.7	35.9	32.0
Particle Size ≥21 µm (c)	counts/mL	5	9.0	9.8	11.4
Particle Size ≥25 µm (c)	counts/mL	5	3.9	5.4	5.2
Particle Size ≥30 µm (c)	counts/mL	5	1.0	1.8	1.7
Particle Size ≥4 µm (c)	ISO scale	5	20.0	0	1.0
Particle Size ≥6 µm (c)	ISO scale	5	19.0	0	1.4
Particle Size ≥14 µm (c)	ISO scale	5	12.8	1.3	2.2

Table 6: reproducibilities of tests on sample #20021 according to IP564

Parameter - IP565	unit	n	average	2.8 * sd	R (lit)
Particle Size ≥4 µm (c)	counts/mL	21	12671	3818	1461
Particle Size ≥6 µm (c)	counts/mL	22	3624	1031	822
Particle Size ≥14 µm (c)	counts/mL	21	107	85.1	67.3
Particle Size ≥21 µm (c)	counts/mL	22	12.4	25.1	12.6
Particle Size ≥25 µm (c)	counts/mL	21	3.8	8.5	5.2
Particle Size ≥30 µm (c)	counts/mL	22	1.4	4.0	2.4
Particle Size ≥4 µm (c)	ISO scale	20	21.0	0.0	1.0
Particle Size ≥6 µm (c)	ISO scale	21	19.0	0.0	1.0
Particle Size ≥14 µm (c)	ISO scale	20	13.8	1.2	1.4

Table 7: reproducibilities of tests on sample #20021 according to IP565

Without further statistical calculations, it can be concluded that for Particle Size there is not a good compliance of the group of participants with the relevant reference test methods. Problematic tests have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF MARCH 2020 WITH PREVIOUS PTS

	March 2020	September 2019	March 2019	September 2018	March 2018
Number of reporting laboratories	90	154	93	152	99
Number of test results	1666	3043	1789	2678	1671
Number of statistical outliers	67	78	53	57	46
Percentage of statistical outliers	4.0%	2.6%	3.0%	2.1%	2.8%

Table 8: 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	March 2020	September 2019	March 2019	September 2018	March 2018
Total Acidity	-	-	-	-	-
Aromatics by FIA	+	+	+	+	+
Aromatics by HPLC	+/-	+/-	+	+	+
Color Saybolt (automated)	-	-	--	--	--
Color Saybolt (manual)	-	-	-	--	--
Density at 15°C	++	++	+	+	+
Distillation at 760 mmHg	+	+	+	+	+
Existent Gum	++	++	++	++	++
Flash Point	+	+	+/-	+/-	+/-
Freezing Point	+	+	+	+/-	+/-
Kinematic Viscosity at -20°C	+/-	+	+/-	+/-	-
Mercaptan Sulfur	+	+	+	+	-
MSEP	+/-	+/-	-	+	+
Naphthalenes	+	+	+	+/-	+/-
Smoke Point	++	+	++	++	+
Specific Energy (Net)	-	-	-	+	+
Total Sulfur	-	+/-	+/-	-	+
- IP564 cumulative counts/mL	+/-	--	-	--	--
- IP564 ISO scale numbers	++	+/-	+/-	-	+
- IP565 cumulative counts/mL	--	--	-	--	--
- IP565 ISO scale numbers	++	+/-	+/-	+/-	-

Table 9: comparison determinations against the reference test methods

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

APPENDIX 1

Determination of Visual Appearance on sample #20020;

lab	method	value	mark	z(targ)	remarks
120	Visual	Clear & Bright		-----	
140		-----		-----	
150	Visual	C&B		-----	
159		-----		-----	
169		-----		-----	
171	Visual	Pass		-----	
175	Visual	clear & bright		-----	
177		-----		-----	
194		-----		-----	
225	Visual	Clear & Bright		-----	
228	Visual	Clear & bright		-----	
237	Visual	C&B		-----	
238		-----		-----	
253	Visual	Clear & Bright		-----	
273	Visual	B&C		-----	
317	Visual	Clear, bright		-----	
323	Visual	clear & bright		-----	
333		-----		-----	
334	Visual	clear and bright FFSM		-----	
335		-----		-----	
336	Visual	C&B		-----	
353	Visual	C+B		-----	
360	Visual	Clear and Bright		-----	
391	Visual	C&B		-----	
396	Visual	Clear&Bright		-----	
398	Visual	Clear & Bright		-----	
399	Visual	C&B		-----	
447	Visual	Clear & Bright		-----	
594		-----		-----	
604		-----		-----	
631	Visual	clear and bright		-----	
634		-----		-----	
663		-----		-----	
671	Visual	C/B		-----	
759	Visual	C&B		-----	
781	Visual	Clear&Bright		-----	
782	Visual	clear and bright		-----	
785	Visual	Clear and bright		-----	
825	Visual	Clear and Bright		-----	
840	Visual	Clear and Bright		-----	
875		-----		-----	
922	Visual	Clear and Bright		-----	
962		-----		-----	
963		-----		-----	
970	Visual	Clear & Bright		-----	
974	Visual	C & B		-----	
998	Visual	C&B		-----	
1039	Visual	clear and bright		-----	
1049	Visual	Br & Cl		-----	
1059	Visual	Clear & Bright		-----	
1062		-----		-----	
1064	Visual	C&B		-----	
1097	Visual	Clair et limpide		-----	
1108	Visual	Clear and bright		-----	
1109	Visual	Particulates Present		-----	
1126		-----		-----	
1191		-----		-----	
1212	Visual	C & B		-----	
1284		-----		-----	
1297		-----		-----	
1299	Visual	Cl & Br		-----	
1397		-----		-----	
1399	Visual	PASS		-----	
1429	Visual	Pass		-----	
1476	Visual	clear fluid, without soluble water, sediments and		-----	
1498	Visual	pass		-----	
1531		clear		-----	
1564		-----		-----	
1585	Visual	clear and bright		-----	
1586	Visual	Clear & Bright		-----	
1587		-----		-----	
1610	Visual	Clear & Bright		-----	
1631	Visual	Clear and Bright		-----	
1634	Visual	C&B		-----	

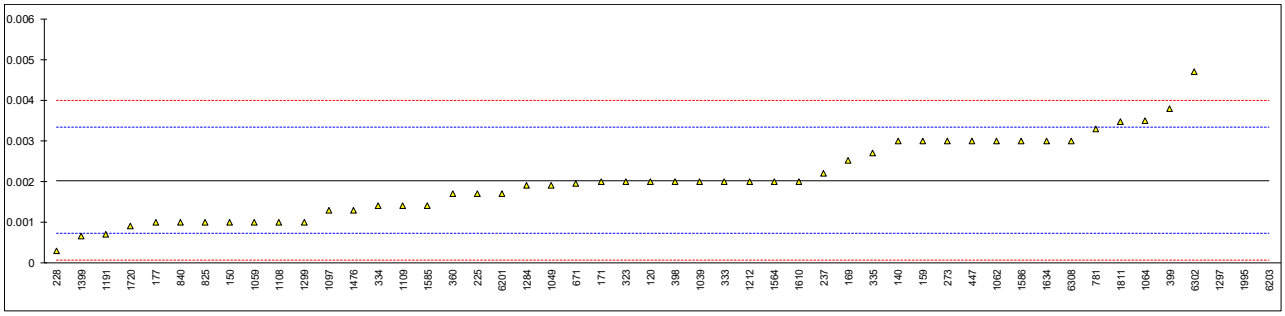
lab	method	value	mark	z(targ)	remarks
1720		-----		-----	
1724	Visual	Clear and Bright		-----	
1740	Visual	bright & Clear, light yellowish		-----	
1755	Visual	Clear,light,without contamination and water		-----	
1757		-----		-----	
1776		-----		-----	
1811		-----		-----	
1881		-----		-----	
1883		C&B		-----	
1995		-----		-----	
2133	Visual	Clear & Bright		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	Visual	Clear & Bright		-----	
6192		-----		-----	
6201	Visual	Bright and Clear		-----	
6203	Visual	clear, bright free form solid matter		-----	
6238		-----		-----	
6262	Visual	Clear and bright		-----	
6299	Visual	Clear, bright and visually free		-----	
6302	Visual	clear and bright free from solid matter and water		-----	
6306	Visual	clear and bright free from solid matter and water		-----	
6308	Visual	Clear and Bright		-----	
6312		-----		-----	
6317	Visual	Bright and clear and free from suspended particles		-----	
	n	64			
	mean (n)	Clear & Bright			

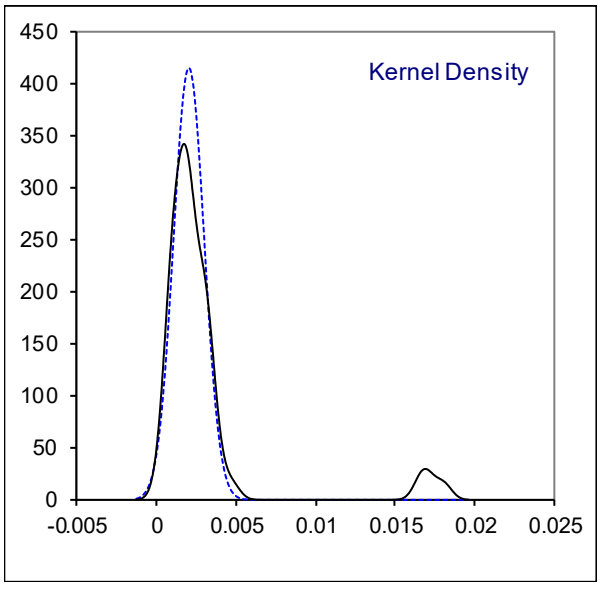
Determination of Total Acidity on sample #20020; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
120	D3242	0.002		-0.05	
140	D3242	0.003		1.48	
150	D3242	0.001		-1.58	
159	D3242	0.003		1.48	
169	D3242	0.002524		0.75	
171	D3242	0.002		-0.05	
175		-----		-----	
177	D3242	0.001		-1.58	
194		-----		-----	
225	D3242	0.0017		-0.51	
228	D3242	0.0003		-2.65	
237	D3242	0.0022		0.26	
238		-----		-----	
253		-----		-----	
273	D3242	0.003		1.48	
317		-----		-----	
323	D3242	0.002		-0.05	
333	D3242	0.002		-0.05	
334	D3242	0.0014		-0.97	
335	D3242	0.0027		1.02	
336		-----		-----	
353		-----		-----	
360	D3242	0.0017		-0.51	
391		-----		-----	
396		-----		-----	
398	D3242	0.0020		-0.05	
399	D3242	0.0038		2.71	
447	D3242	0.003		1.48	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671	D3242	0.00196		-0.11	
759		-----		-----	
781	D3242	0.0033		1.94	
782		-----		-----	
785		-----		-----	
825	D3242	0.001		-1.58	
840	D3242	0.0010		-1.58	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974		-----		-----	
998		-----		-----	
1039	D3242	0.002		-0.05	
1049	D3242	0.00191		-0.18	
1059	D3242	0.001		-1.58	
1062	D3242	0.003		1.48	
1064	D3242	0.0035		2.25	
1097	D3242	0.0013		-1.12	
1108	D3242	0.001	C	-1.58	first reported 0.0059
1109	D3242	0.0014		-0.97	
1126		-----		-----	
1191	D3242	0.0007176		-2.01	
1212	D3242	0.002		-0.05	
1284	D3242	0.0019		-0.20	
1297	D664-A	0.0166	R(0.01)	22.30	
1299	D3242	0.001		-1.58	
1397		-----		-----	
1399	D3242	0.000652		-2.11	
1429		-----		-----	
1476	In house	0.0013		-1.12	
1498		-----		-----	
1531		-----		-----	
1564	D3242	0.002		-0.05	
1585	D3242	0.0014		-0.97	
1586	D3242	0.003		1.48	
1587		-----		-----	
1610	IP354	0.002		-0.05	
1631	D3242	<0.001		-----	
1634	D3242	0.003		1.48	
1720	D3242	0.0009		-1.73	

lab	method	value	mark	z(targ)	remarks
1724	D3242	<0,001		-----	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D3242	0.00348		2.22	
1881		-----		-----	
1883		-----		-----	
1995	D664	0.017	R(0.01)	22.91	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D3242	0.0017		-0.51	
6203	D3242	0.018	R(0.01)	24.44	
6238		-----		-----	
6262		-----		-----	
6299		-----		-----	
6302	D664-A	0.0047	C	4.09	first reported 0.047
6306		-----		-----	
6308	IP354	0.003		1.48	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	47
outliers	3
mean (n)	0.00203
st.dev. (n)	0.000959
R(calc.)	0.00269
st.dev.(D3242:11)	0.000653
R(D3242:11)	0.00183



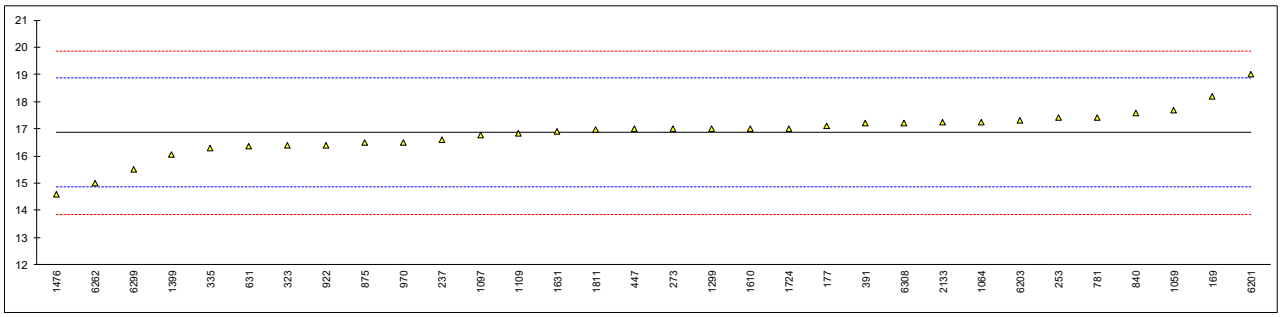


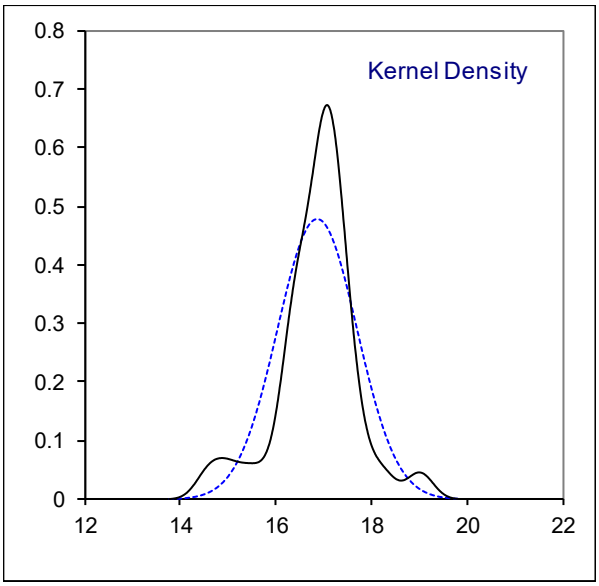
Determination of Aromatics by FIA on sample #20020; results in %V/V

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
140		-----		-----	
150		-----		-----	
159		-----		-----	
169	D1319	18.2		1.34	
171		-----		-----	
175		-----		-----	
177	D1319	17.1		0.25	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237	D1319	16.6		-0.25	
238		-----		-----	
253	D1319	17.40		0.55	
273	D1319	17.0		0.15	
317		-----		-----	
323	D1319	16.4		-0.45	
333		-----		-----	
334		-----		-----	
335	D1319	16.3		-0.55	
336		-----		-----	
353		-----		-----	
360		-----		-----	
391	D1319	17.2		0.35	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	D1319	16.996		0.14	
594		-----		-----	
604		-----		-----	
631	D1319	16.348		-0.50	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D1319	17.4		0.55	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D1319	17.59		0.74	
875	EN15553	16.5		-0.35	
922	D1319	16.4		-0.45	
962		-----		-----	
963		-----		-----	
970	D1319	16.5		-0.35	
974		-----		-----	
998		-----		-----	
1039		-----		-----	
1049		-----		-----	
1059	D1319	17.7		0.85	
1062		-----		-----	
1064	D1319	17.25		0.40	
1097	D1319	16.77		-0.08	
1108		-----		-----	
1109	D1319	16.85		0.00	
1126		-----		-----	
1191		-----		-----	
1212		-----		-----	
1284		-----		-----	
1297		-----		-----	
1299	D1319	17.0		0.15	
1397		-----		-----	
1399	D1319	16.06		-0.79	
1429		-----		-----	
1476	EN15553	14.586		-2.26	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585		-----		-----	
1586		-----		-----	
1587		-----		-----	
1610	IP156	17.0		0.15	
1631	EN15553	16.9		0.05	
1634		-----		-----	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724	D1319	17.0		0.15	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D1319	16.98		0.13	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133	D1319	17.24		0.39	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D1319	19.0		2.14	
6203	D1319	17.3		0.45	
6238		-----		-----	
6262	D1319	15.0		-1.85	
6299	D1319	15.5		-1.35	
6302		-----		-----	
6306		-----		-----	
6308	IP156	17.2		0.35	
6312		-----		-----	
6317		-----		-----	

normality	not OK
n	32
outliers	0
mean (n)	16.852
st.dev. (n)	0.8336
R(calc.)	2.334
st.dev.(D1319:19)	1.0031
R(D1319:19)	2.809



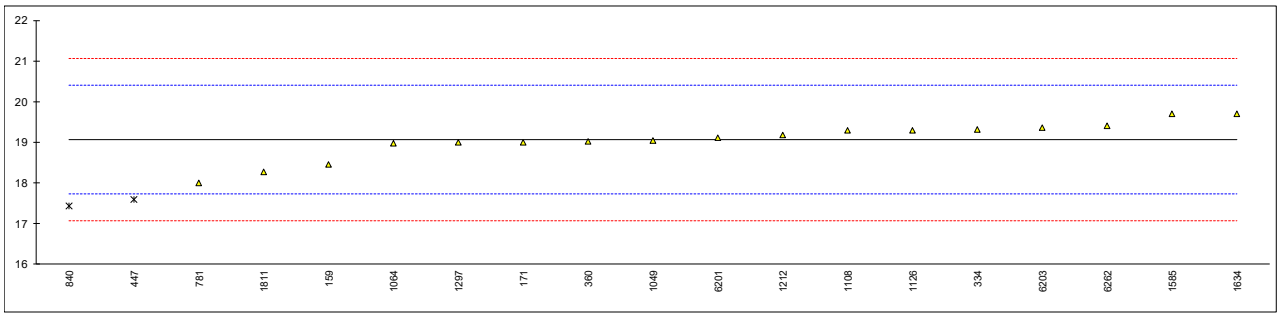


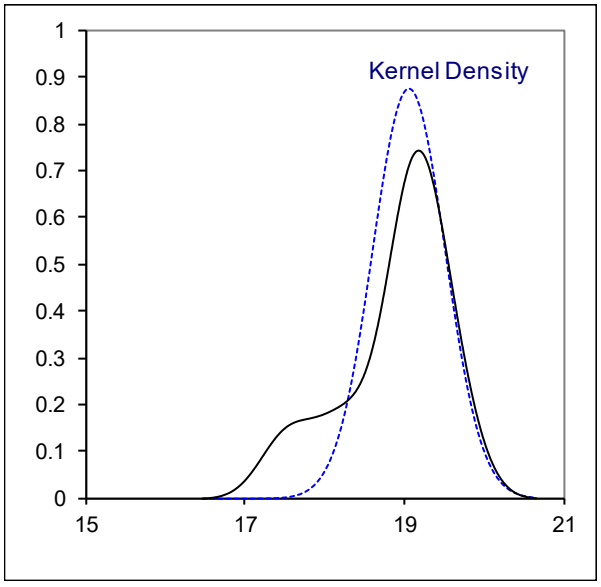
Determination of Mono Aromatics (MAH) by HPLC on sample #20020; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
140		-----		-----	
150		-----		-----	
159	D6379	18.444		-0.93	
169		-----		-----	
171	D6379	19.0		-0.09	
175		-----		-----	
177		-----		-----	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237		-----		-----	
238		-----		-----	
253		-----		-----	
273		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
334	D6379	19.31		0.37	
335		-----		-----	
336		-----		-----	
353		-----		-----	
360	D6379	19.01		-0.08	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	IP436	17.59	G(0.05)	-2.21	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D6379	18.0		-1.60	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D6379	17.43	G(0.05)	-2.45	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974		-----		-----	
998		-----		-----	
1039		-----		-----	
1049	D6379	19.045		-0.03	
1059		-----		-----	
1062		-----		-----	
1064	D6379	18.98		-0.12	
1097		-----		-----	
1108	D6379	19.3		0.36	
1109		-----		-----	
1126	EN12916	19.3		0.36	
1191		-----		-----	
1212	D6379	19.17		0.16	
1284		-----		-----	
1297	EN12916	18.99		-0.11	
1299		-----		-----	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	D6379	19.69		0.94	
1586		-----		-----	
1587		-----		-----	
1610		-----		-----	
1631		-----	W	-----	Test result withdrawn. First reported 13.4
1634	D6379	19.7		0.96	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724		-----		-----	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D6379	18.28		-1.18	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D6379	19.1		0.06	
6203	D6379	19.35		0.43	
6238		-----		-----	
6262	EN12916	19.398		0.50	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308		-----		-----	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	17
outliers	2
mean (n)	19.063
st.dev. (n)	0.4559
R(calc.)	1.276
st.dev.(D6379:11)	0.6658
R(D6379:11)	1.864



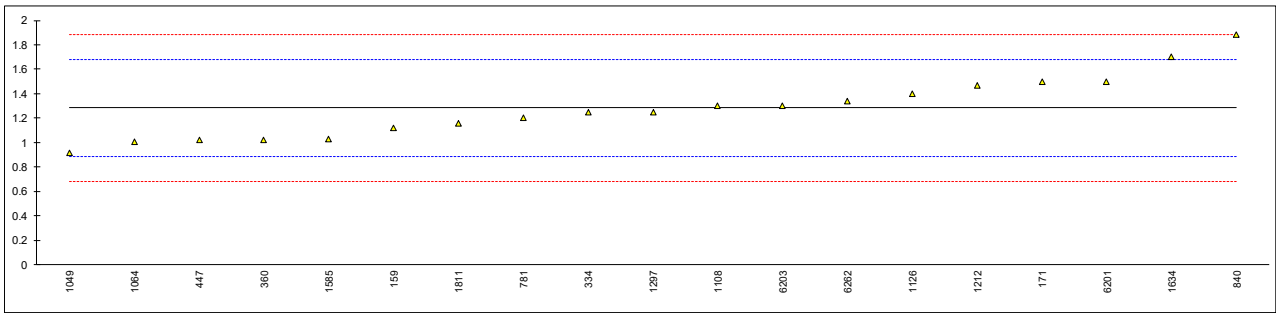


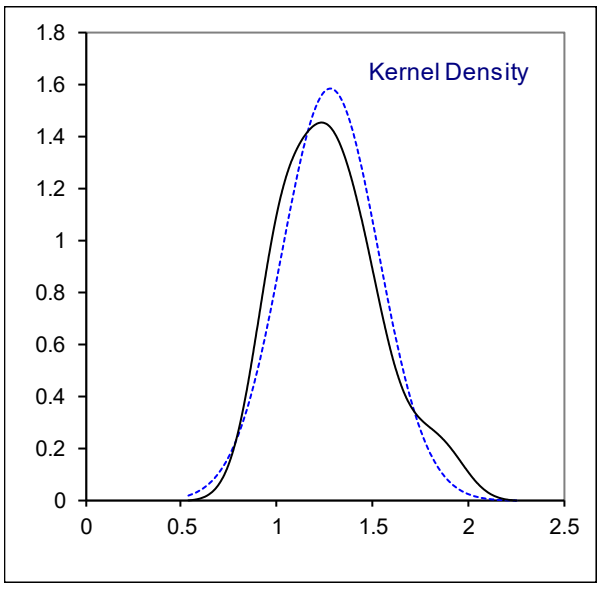
Determination of Di Aromatics (DAH) by HPLC on sample #20020; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
140		-----		-----	
150		-----		-----	
159	D6379	1.120		-0.81	
169		-----		-----	
171	D6379	1.5		1.09	
175		-----		-----	
177		-----		-----	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237		-----		-----	
238		-----		-----	
253		-----		-----	
273		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
334	D6379	1.25		-0.16	
335		-----		-----	
336		-----		-----	
353		-----		-----	
360	D6379	1.02		-1.32	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	IP436	1.02		-1.32	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D6379	1.2		-0.41	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D6379	1.88		3.00	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974		-----		-----	
998		-----		-----	
1039		-----		-----	
1049	D6379	0.916		-1.84	
1059		-----		-----	
1062		-----		-----	
1064	D6379	1.01		-1.37	
1097		-----		-----	
1108	D6379	1.3		0.09	
1109		-----		-----	
1126	EN12916	1.4		0.59	
1191		-----		-----	
1212	D6379	1.47		0.94	
1284		-----		-----	
1297	EN12916	1.25		-0.16	
1299		-----		-----	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	D6379	1.03		-1.27	
1586		-----		-----	
1587		-----		-----	
1610		-----		-----	
1631		-----	W	-----	Test result withdrawn. First reported 0.78
1634	D6379	1.7		2.09	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724		-----		-----	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D6379	1.16		-0.61	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D6379	1.5		1.09	
6203	D6379	1.30		0.09	
6238		-----		-----	
6262	EN12916	1.342		0.30	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308		-----		-----	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	19
outliers	0
mean (n)	1.283
st.dev. (n)	0.2516
R(calc.)	0.705
st.dev.(D6379:11)	0.1994
R(D6379:11)	0.558



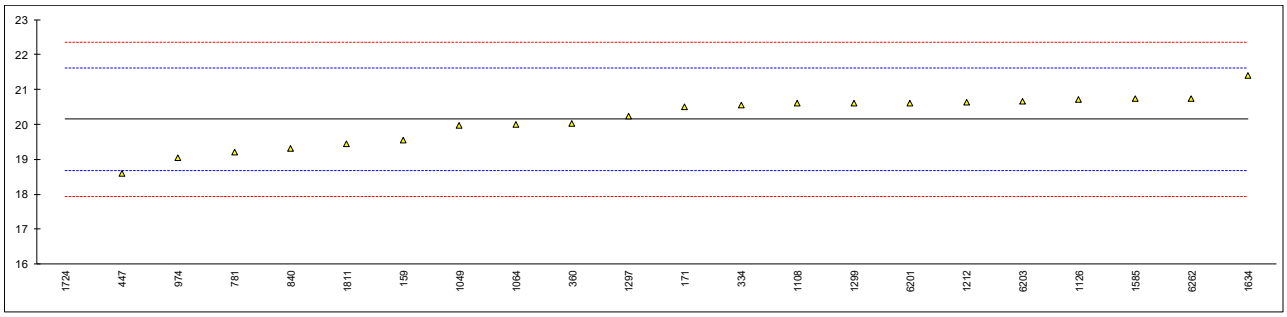


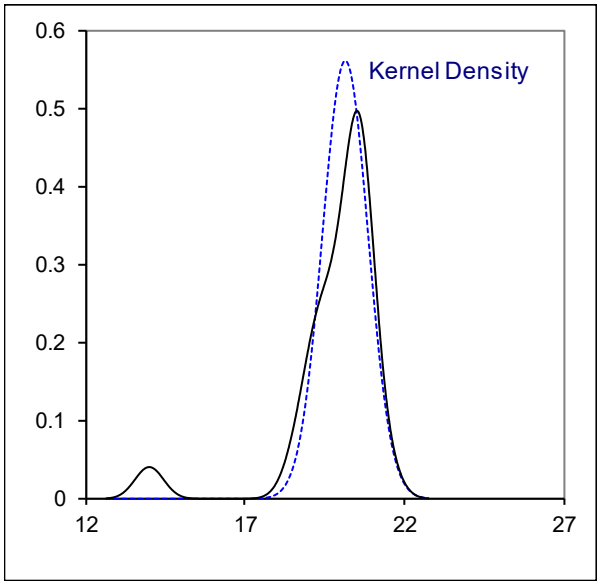
Determination of Total Aromatics by HPLC on sample #20020; results in %M/M

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
140		-----		-----	
150		-----		-----	
159	D6379	19.542		-0.82	
169		-----		-----	
171	D6379	20.5		0.48	
175		-----		-----	
177		-----		-----	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237		-----		-----	
238		-----		-----	
253		-----		-----	
273		-----		-----	
317		-----		-----	
323		-----		-----	
333		-----		-----	
334	D6379	20.56		0.56	
335		-----		-----	
336		-----		-----	
353		-----		-----	
360	D6379	20.03		-0.16	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	IP436	18.61		-2.09	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D6379	19.2		-1.29	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D6379	19.31		-1.14	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974	D6379	19.05		-1.49	
998		-----		-----	
1039		-----		-----	
1049	D6379	19.961		-0.25	
1059		-----		-----	
1062		-----		-----	
1064	D6379	19.99		-0.21	
1097		-----		-----	
1108	D6379	20.6		0.62	
1109		-----		-----	
1126	EN12916	20.7		0.75	
1191		-----		-----	
1212	D6379	20.64		0.67	
1284		-----		-----	
1297	EN12916	20.24		0.13	
1299	IP436	20.6		0.62	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	D6379	20.73		0.79	
1586		-----		-----	
1587		-----		-----	
1610		-----		-----	
1631		-----	W	-----	Test result withdrawn. First reported 14.2
1634	D6379	21.4		1.70	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724	IP391	14.03	R(0.01)	-8.31	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D6379	19.44		-0.96	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D6379	20.6		0.62	
6203	D6379	20.65		0.68	
6238		-----		-----	
6262	EN12916	20.739		0.80	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308		-----		-----	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	21
outliers	1
mean (n)	20.147
st.dev. (n)	0.7101
R(calc.)	1.988
st.dev.(D6379:11)	0.7359
R(D6379:11)	2.060



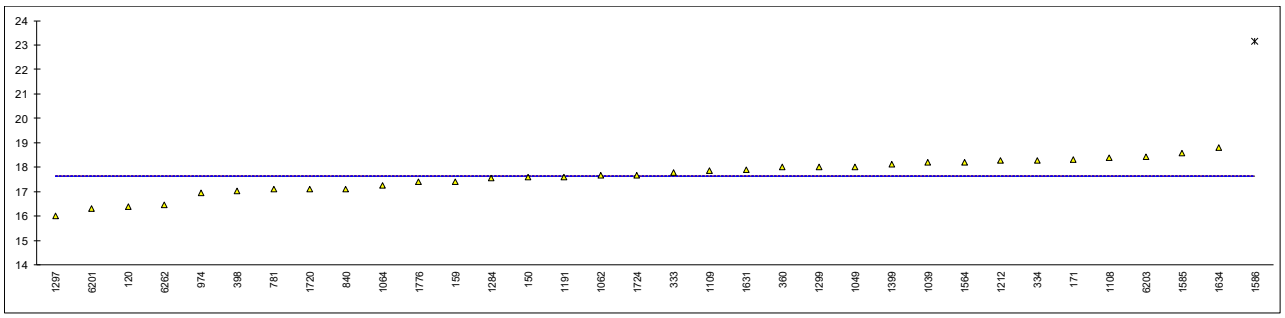


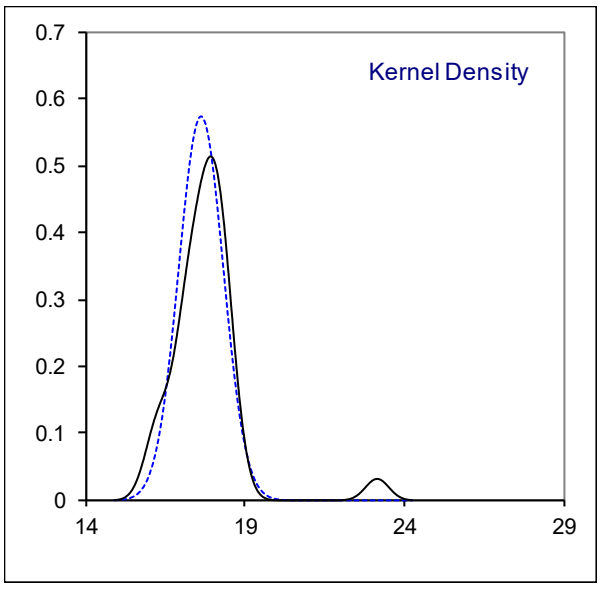
Determination of Total Aromatics by HPLC on sample #20020; results in %V/V

lab	method	value	mark	z(targ)	remarks
120	D6379	16.39		-----	
140		-----		-----	
150	D6379	17.6		-----	
159	D6379	17.42	C	-----	first reported 22.05
169		-----		-----	
171	D6379	18.3		-----	
175		-----		-----	
177		-----		-----	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237		-----		-----	
238		-----		-----	
253		-----		-----	
273		-----		-----	
317		-----		-----	
323		-----		-----	
333	D6379	17.8		-----	
334	D6379	18.29		-----	
335		-----		-----	
336		-----		-----	
353		-----		-----	
360	D6379	18.00		-----	
391		-----		-----	
396		-----		-----	
398	D6379	17.02		-----	
399		-----		-----	
447		-----		-----	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D6379	17.1		-----	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D6379	17.12		-----	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974	D6379	16.95		-----	
998		-----		-----	
1039	D6379	18.2		-----	
1049	D6379	18.01319		-----	
1059		-----		-----	
1062		17.68		-----	
1064	D6379	17.24		-----	
1097		-----		-----	
1108	D6379	18.4		-----	
1109	D6379	17.86	C	-----	first reported 20.20
1126		-----		-----	
1191	D6379	17.612		-----	
1212	D6379	18.26		-----	
1284	D6379	17.57		-----	
1297	EN12916	16.02		-----	
1299		18.0		-----	
1397		-----		-----	
1399	IP436	18.1291		-----	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564	D6379	18.208		-----	
1585	D6379	18.57		-----	
1586	D6379	23.14	C,R(0.01)	-----	first reported 14.23
1587		-----		-----	
1610		-----		-----	
1631	D6379	17.9		-----	
1634	D6379	18.8		-----	
1720	D6379	17.1		-----	

lab	method	value	mark	z(targ)	remarks
1724	IP391	17.69		-----	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776	D6379	17.41338		-----	
1811		-----		-----	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D6379	16.3		-----	
6203	D6379	18.44		-----	
6238		-----		-----	
6262	EN12916	16.45		-----	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308		-----		-----	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	33
outliers	1
mean (n)	17.632
st.dev. (n)	0.6952
R(calc.)	1.947
R(lit)	unknown
Compare R(iis19J01)	1.382
Compare R(iis19J02)	1.563

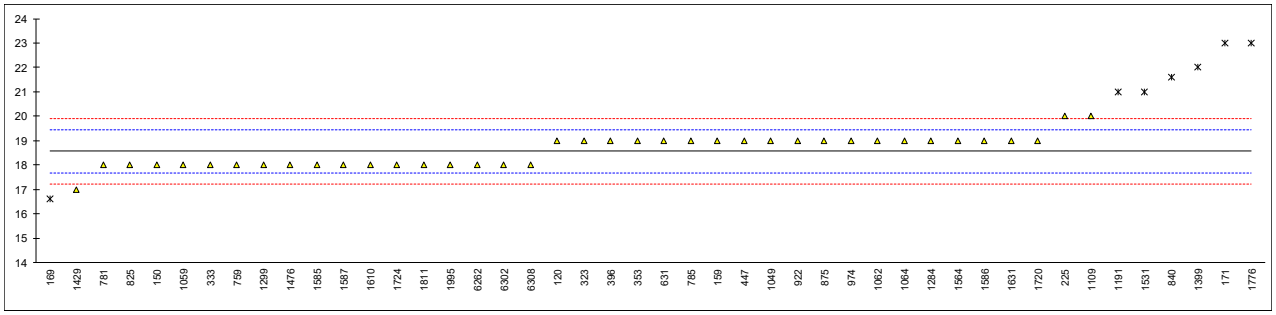


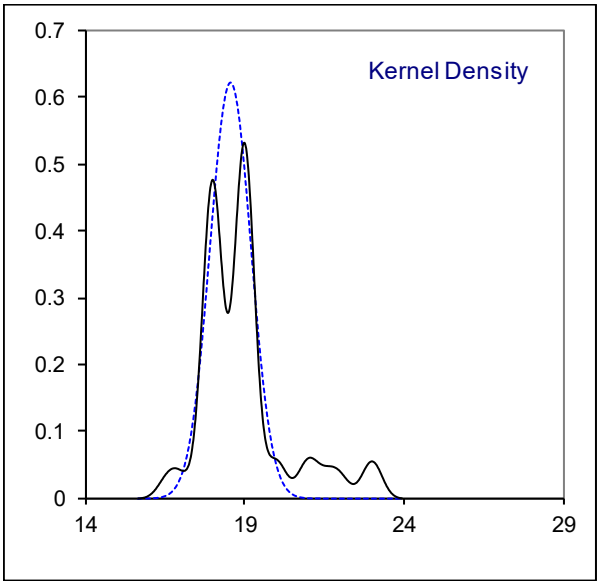


Determination of Color Saybolt (Automated) on sample #20020; cell size in mm;

lab	method	value	mark	z(targ)	cell size in mm	remarks
120	D6045	19		0.98		
140		-----		-----		
150	D6045	18		-1.27	100	
159	D6045	19		0.98	33	
169	D6045	16.6	R(0.05)	-4.44	50	
171	D6045	23	R(0.05)	10.02	50	
175		-----		-----		
177		-----		-----		
194		-----		-----		
225	D6045	20		3.24		
228		-----		-----		
237		-----		-----		
238		-----		-----		
253		-----		-----		
273		-----		-----		
317		-----		-----		
323	D6045	19		0.98	10	
333	D6045	18		-1.27		
334		-----		-----		
335		-----		-----	50	
336		-----		-----		
353	D6045	19		0.98		
360		-----		-----		
391		-----		-----		
396	D6045	19		0.98	50	
398		-----		-----		
399		-----		-----		
447	D6045	19		0.98	100	
594		-----		-----		
604		-----		-----		
631	D6045	19		0.98	100	
634		-----		-----		
663		-----		-----		
671		-----		-----		
759	D6045	18		-1.27	100	
781	D6045	18		-1.27	100	
782		-----		-----		
785	D6045	19		0.98	50	
825	D6045	18		-1.27	33	
840	D6045	21.6	R(0.05)	6.86	100	
875	D6045	19		0.98		
922	D6045	19		0.98	100	
962		-----		-----		
963		-----		-----		
970		-----		-----		
974	D6045	19		0.98	100	
998		-----		-----		
1039		-----		-----	100	
1049	D6045	19		0.98	50	
1059	D6045	18		-1.27	50	
1062	D6045	19		0.98	50	
1064	D6045	19		0.98	50	
1097		-----		-----		
1108		-----		-----		
1109	D6045	20		3.24	100	
1126		-----		-----		
1191	D6045	21	R(0.05)	5.50	100	
1212		-----		-----		
1284	D6045	19		0.98		
1297		-----		-----		
1299	D6045	18		-1.27		
1397		-----		-----		
1399	D156	22	R(0.05)	7.76	50	
1429	D6045	17		-3.53	50	
1476	D6045	18.0		-1.27	50	
1498		-----		-----		
1531	D6045	21	R(0.05)	5.50	50	
1564	D6045	19		0.98	50	
1585	D6045	18.0		-1.27	100	
1586	D6045	19		0.98	50	
1587	D6045	18.0		-1.27	50	
1610	D6045	18		-1.27		
1631	D6045	19		0.98		
1634		-----		-----		
1720	D6045	19		0.98	50	

lab	method	value	mark	z(targ)	cell size in mm	remarks
1724	D6045	18		-1.27	33	
1740		-----		-----		
1755		-----		-----		
1757		-----		-----		
1776	D6045	23.0	R(0.05)	10.02		
1811	D6045	18		-1.27	50	
1881		-----		-----		
1883		-----		-----		
1995	D6045	18		-1.27	25	
2133		-----		-----		
6075		-----		-----		
6142		-----		-----		
6154		-----		-----		
6174		-----		-----		
6192		-----		-----		
6201		-----		-----		
6203		-----		-----		
6238		-----		-----		
6262	D6045	18		-1.27	50	
6299		-----		-----		
6302	D6045	18		-1.27	50	
6306		-----		-----		
6308	D6045	18		-1.27	50	
6312		-----		-----		
6317		-----		-----		
					50 mm cell only:	100 mm cell only:
	normality	OK			OK	OK
	n	39			16	9
	outliers	7			4	2
	mean (n)	18.56			18.44	18.67
	st.dev. (n)	0.641			0.629	0.707
	R(calc.)	1.79			1.76	1.98
	st.dev.(D6045:12)	0.443			0.443	0.443
	R(D6045:12)	1.24			1.24	1.24



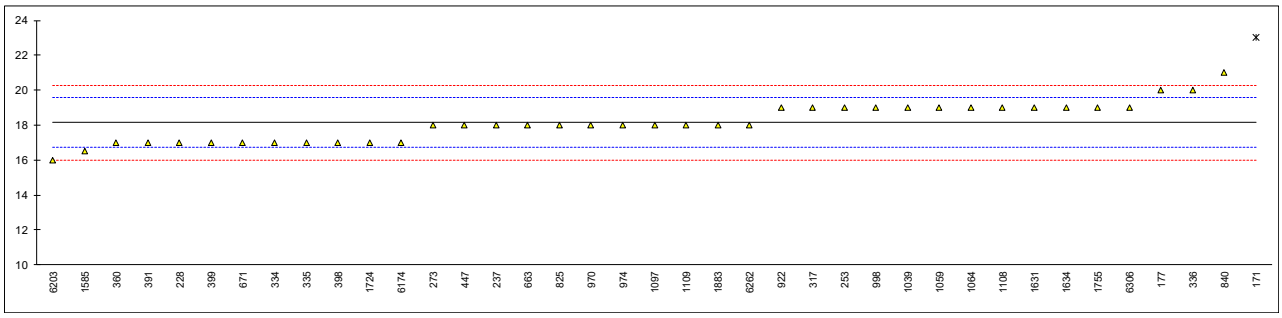


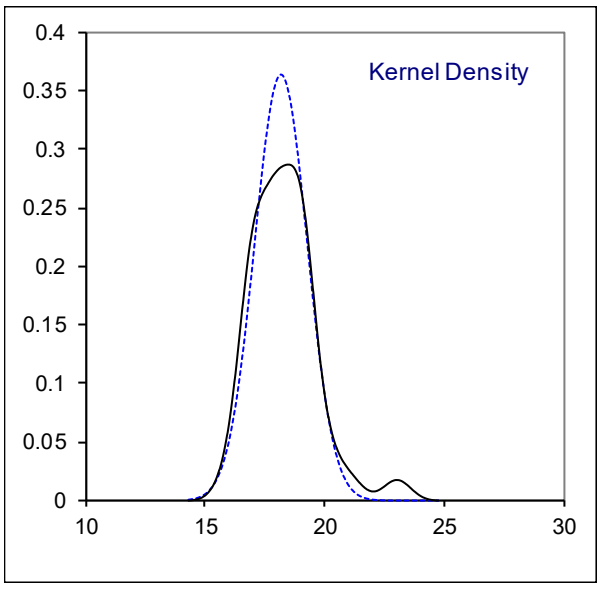
Determination of Color Saybolt (Manual) on sample #20020;

lab	method	value	mark	z(targ)	remarks
120		-----		-----	
140		-----		-----	
150		-----		-----	
159		-----		-----	
169		-----		-----	
171	D156	23	R(0.01)	6.80	
175		-----		-----	
177	D156	20		2.60	
194		-----		-----	
225		-----		-----	
228	D156	17		-1.60	
237	D156	18		-0.20	
238		-----		-----	
253	D156	19		1.20	
273	D156	18		-0.20	
317	D156	19		1.20	
323		-----		-----	
333		-----		-----	
334	D156	17		-1.60	
335	D156	17		-1.60	
336	D156	20		2.60	
353		-----		-----	
360	D156	17		-1.60	
391	D156	17		-1.60	
396		-----		-----	
398	D156	17		-1.60	
399	D156	17		-1.60	
447	D156	18		-0.20	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663	D156	18		-0.20	
671	D156	17		-1.60	
759		-----		-----	
781		-----		-----	
782		-----		-----	
785		-----		-----	
825	D156	18		-0.20	
840	D156	21		4.00	
875		-----		-----	
922	D156	19		1.20	
962		-----		-----	
963		-----		-----	
970	D156	18		-0.20	
974	D156	18		-0.20	
998	D156	19		1.20	
1039	D156	19		1.20	
1049		-----		-----	
1059	D156	19		1.20	
1062		-----		-----	
1064	D156	19		1.20	
1097	NF-M07-003	18		-0.20	
1108	D156	19		1.20	
1109	D156	18		-0.20	
1126		-----		-----	
1191		-----		-----	
1212		-----		-----	
1284		-----		-----	
1297		-----		-----	
1299		-----		-----	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	D156	16.5		-2.30	
1586		-----		-----	
1587		-----		-----	
1610		-----		-----	
1631	D156	19		1.20	
1634	D156	19		1.20	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724	D156	17		-1.60	
1740		-----		-----	
1755	D156	19		1.20	
1757		-----		-----	
1776		-----		-----	
1811		-----		-----	
1881		-----		-----	
1883	D156	18		-0.20	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	D156	17		-1.60	
6192		-----		-----	
6201		-----		-----	
6203	D156	16		-3.00	
6238		-----		-----	
6262	D156	18.0		-0.20	
6299		-----		-----	
6302		-----		-----	
6306	D156	19		1.20	
6308		-----		-----	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	38
outliers	1
mean (n)	18.14
st.dev. (n)	1.096
R(calc.)	3.07
st.dev.(D156:15)	0.714
R(D156:15)	2





Determination of Copper Corrosion 2hr at 100°C on sample #20020;

lab	method	value	mark	z(targ)	remarks
120	D130	1A		-----	
140		-----		-----	
150	D130	1a		-----	
159	D130	1a		-----	
169	D130	1a		-----	
171	D130	1a	C	-----	first reported 2a
175	D130	1		-----	
177	D130	1b		-----	
194		-----		-----	
225	D130	1a		-----	
228	D130	1A		-----	
237	D130	1A		-----	
238	D130	1A		-----	
253	D130	1A		-----	
273	D130	1a		-----	
317	D130	1a		-----	
323	D130	1A		-----	
333	D130	1a		-----	
334	D130	1A		-----	
335		-----		-----	
336	D130	1		-----	
353	IP154	1a		-----	
360	D130	1A		-----	
391	D130	1A		-----	
396	D130	1a		-----	
398	D130	1a		-----	
399	D130	1A		-----	
447	IP154	1a		-----	
594		-----		-----	
604		-----		-----	
631	D130	1A		-----	
634		-----		-----	
663	D130	1a		-----	
671	D130	1a		-----	
759		-----		-----	
781	D130	1A		-----	
782		-----		-----	
785	D130	1a		-----	
825	D130	1a		-----	
840	D130	1a		-----	
875	D130	1a		-----	
922	D130	1a		-----	
962		-----		-----	
963		-----		-----	
970	D130	1a		-----	
974	D130	1a		-----	
998	D130	1A		-----	
1039	ISO2160	1B		-----	
1049	D130	1A		-----	
1059	D130	1a		-----	
1062		1B		-----	
1064	D130	1a		-----	
1097	ISO2160	1a		-----	
1108		-----		-----	
1109	D130	1a		-----	
1126		-----		-----	
1191		-----		-----	
1212	D130	1A		-----	
1284		-----		-----	
1297	D130	1a		-----	
1299	D130	1A		-----	
1397		-----		-----	
1399	D130	1A		-----	
1429	D130	1B		-----	
1476	ISO2160	1a		-----	
1498		-----		-----	
1531	D130	1a		-----	
1564	D130	1a		-----	
1585	D130	1a		-----	
1586	D130	1a		-----	
1587	D130	1A		-----	
1610	D130	1a		-----	
1631	D130	1		-----	
1634	D130	1a		-----	
1720	D130	1a		-----	

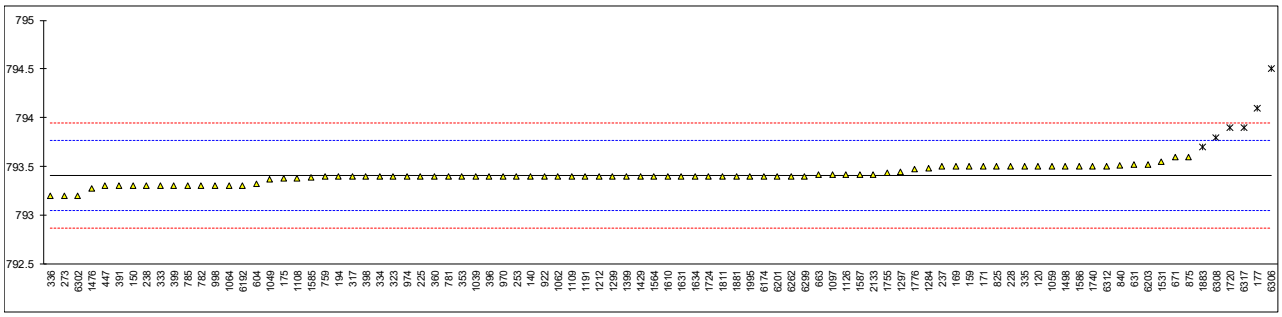
lab	method	value	mark	z(targ)	remarks
1724	D130	1a		-----	
1740	ISO2160	1A		-----	
1755	D130	1A		-----	
1757		-----		-----	
1776		-----		-----	
1811		-----		-----	
1881		-----		-----	
1883	D130	1		-----	
1995		1A		-----	
2133	D130	1a		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	D130	1A		-----	
6192		-----		-----	
6201	D130	1A		-----	
6203	ISO2160	1 a		-----	
6238		-----		-----	
6262	D130	1A		-----	
6299	ISO2160	1a		-----	
6302	D130	1a		-----	
6306	D130	1a		-----	
6308	IP154	1a		-----	
6312	IP154	1a		-----	
6317	D130	1a		-----	
	n	75			
	mean (n)	1 (1a / 1b)			

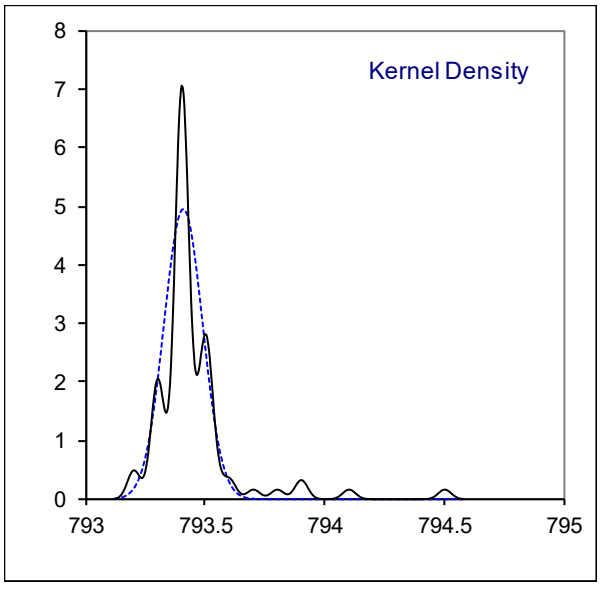
Determination of Density at 15°C on sample #20020; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
120	D4052	793.5		0.52	
140	D4052	793.4		-0.04	
150	D4052	793.3		-0.60	
159	D4052	793.5		0.52	
169	D4052	793.5	C	0.52	first reported 0.7935 kg/m^3
171	D4052	793.5		0.52	
175	D4052	793.38		-0.15	
177	D4052	794.1	R(0.01)	3.88	
194	D4052	793.4		-0.04	
225	D4052	793.4		-0.04	
228	D4052	793.5		0.52	
237	D4052	793.5		0.52	
238	D4052	793.3		-0.60	
253	D4052	793.4		-0.04	
273	D4052	793.2		-1.16	
317	D4052	793.4		-0.04	
323	D4052	793.4		-0.04	
333	D4052	793.3		-0.60	
334	D4052	793.4		-0.04	
335	D4052	793.5		0.52	
336	D4052	793.2		-1.16	
353	IP365	793.4		-0.04	
360	D4052	793.4		-0.04	
391	D4052	793.3		-0.60	
396	D4052	793.4		-0.04	
398	ISO12185	793.4		-0.04	
399	D4052	793.3		-0.60	
447	D4052	793.3		-0.60	
594		-----		-----	
604	D4052	793.32		-0.49	
631	D4052	793.52		0.63	
634		-----		-----	
663	D4052	793.42		0.07	
671	D4052	793.6		1.08	
759	D4052	793.4		-0.04	
781	D4052	793.4		-0.04	
782	D4052	793.3		-0.60	
785	D4052	793.3		-0.60	
825	D4052	793.5		0.52	
840	D4052	793.51		0.58	
875	D4052	793.6		1.08	
922	D4052	793.4		-0.04	
962		-----		-----	
963		-----		-----	
970	D4052	793.4		-0.04	
974	D1298	793.4		-0.04	
998	D4052	793.3		-0.60	
1039	ISO12185	793.4		-0.04	
1049	D4052	793.37		-0.21	
1059	D4052	793.5		0.52	
1062	D4052	793.4		-0.04	
1064	D4052	793.3		-0.60	
1097	ISO12185	793.42		0.07	
1108	D4052	793.38		-0.15	
1109	D4052	793.4		-0.04	
1126	D4052	793.42		0.07	
1191	D4052	793.4		-0.04	
1212	D4052	793.4		-0.04	
1284	D4052	793.48		0.41	
1297	D4052	793.45		0.24	
1299	D4052	793.4		-0.04	
1397		-----		-----	
1399	D4052	793.4		-0.04	
1429	ISO12185	793.4		-0.04	
1476	ISO12185	793.28		-0.71	
1498	D4052	793.5		0.52	
1531	ISO12185	793.55		0.80	
1564	D4052	793.4		-0.04	
1585	D4052	793.39		-0.09	
1586	D4052	793.5		0.52	
1587	D4052	793.42		0.07	
1610	IP365	793.4		-0.04	
1631	D4052	793.4		-0.04	
1634	D4052	793.4		-0.04	
1720	D4052	793.9	R(0.01)	2.76	

lab	method	value	mark	z(targ)	remarks
1724	D4052	793.4		-0.04	
1740	ISO3675	793.5		0.52	
1755	D4052	793.44		0.19	
1757		-----		-----	
1776	ISO12185	793.47		0.35	
1811	D4052	793.4		-0.04	
1881	ISO12185	793.40		-0.04	
1883	D1298	793.7	R(0.05)	1.64	
1995	D4052	793.4		-0.04	
2133	D4052	793.42		0.07	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	D4052	793.4		-0.04	
6192	D1298	793.3		-0.60	
6201	D4052	793.4		-0.04	
6203	D4052	793.52		0.63	
6238		-----		-----	
6262	D4052	793.4	C	-0.04	first reported 0.7934 no unit
6299	ISO12185	793.40		-0.04	
6302	D4052	793.2		-1.16	
6306	D1298	794.5	R(0.01)	6.12	
6308	IP365	793.8	R(0.01)	2.20	
6312	IP365	793.5		0.52	
6317	D4052	793.9	R(0.01)	2.76	

normality	OK
n	84
outliers	6
mean (n)	793.407
st.dev. (n)	0.0806
R(calc.)	0.226
st.dev.(D4052:18a)	0.1786
R(D4052:18a)	0.5





Determination of Distillation at 760 mmHg on sample #20020; results in °C

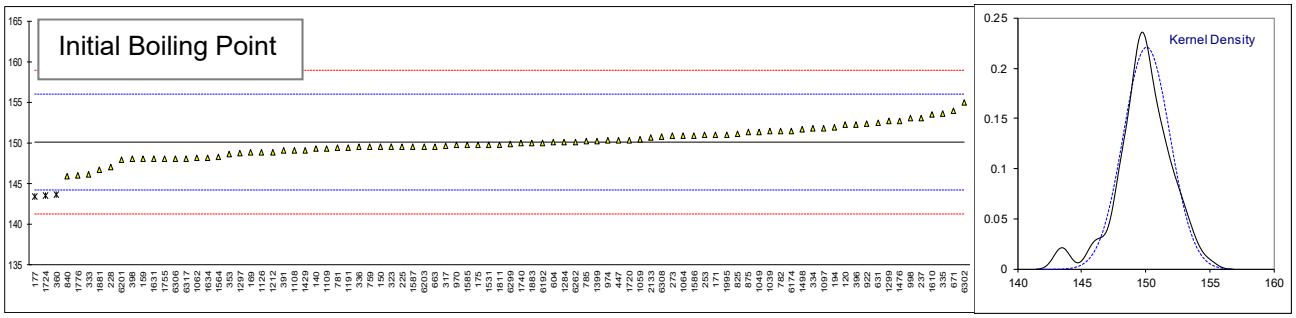
lab	method	IBP	m	10% rec	m	50% rec	m	90% rec	m	FBP	m	Res.	Loss
120	D86-A	152.3		168.3		193.2		235.2		261.8		1.0	1.0
140	D86-A	149.3		167.9		194.2		235.4		261.2		1.2	1.0
150	D86-A	149.5		168.3		193.3		233.9		261.1		1.2	0.3
159	D86-A	148.0		166.7		193.2		233.0		260.0		1.4	0.2
169	D86-A	148.8		168.1		193.1		234.1		261.8		1.2	0.3
171	D86-A	151.0		168.7		194.5		236.4		265.2		1.1	0.9
175	D86-A	149.8		168.5		194.8		236.6		264.4		1.1	0.9
177	D86	143.4	R5	167.4		194.1		234.2		262.5		1.2	0.5
194	D86-A	151.9		169.7		194.5		234.7		263.3		1.2	0.5
225	D86-M	149.5		170.0		193.0		234.5		260.5		1.4	0.6
228	D86-M	147.0		169.0		193.0		229.0	R1	259.0		1.2	0.3
237	D86-M	153.0		170.0		195.0		237.0		261.0		1.0	0.5
238		-----		-----		-----		-----		-----		-----	-----
253	D86-M	151.0		170.0		195.5		237.0		261.0		1.0	0.8
273	D86-A	150.9		169.7		193.9		234.2		262.6		1.1	-----
317	D86-A	149.6		168.9		194.1		234.3		262.5		1.3	0.4
323	D86-A	149.5		169.3		194.0		235.0		261.3		1.0 C	1.0
333	D86-A	146.1		168.1		193.4		233.5		260.0		1.3	0.4
334	D86-A	151.8		169.1		194.1		233.8		260.8		1.0	0.1
335	D86-A	153.6		168.9		193.3		235.2		261.4		1.0	0.2
336	D86-A	149.5		168.7		193.5		233.4		261.1		1.2	0.0
353	IP123-A	148.6		168.0		192.9		235.3		260.4		1.2	0.4
360	D86-A	143.6	R5	168.2		193.4		233.3		258.9		1.2	0.1
391	D86-A	149.1		168.1		193.4		234.1		263.4		1.3	0
396	D86-M	152.3		166.1		192.6		235.2		262.8		1.0	0.6
398	D86-A	148.0		168.4		193.5		234.4		263.0		1.2	0.2
399		-----		-----		-----		-----		-----		-----	-----
447	D86-A	150.3		169.1		194.1		236.5		264.4		1.3	0.9
594		-----		-----		-----		-----		-----		-----	-----
604	D86-A	150.1		170.2		194.7		235.8	C	262.4		1.2	1.2
631	D86-M	152.5		169.5		193.5		236.5		264.0		1.1	0.9
634		-----		-----		-----		-----		-----		-----	-----
663	D86-A	149.55		169.15		194.05		235.60		261.20		1.45	0.65
671	D86-A	153.9		169.9		194.6		236.3		263.6		1.3	1.2
759	D86-M	149.5		168.0		194.0		234.5		262.0		1.2	0.3
781	D86-A	149.4		169.3		194.1		234.5		263.7		1.1	0.4
782	ISO3405-M	151.5		169.5		194.0		235.5		266.0		1.0	0.0
785	D86-A	150.2		167.9		193.0		235.5		261.3		1.2	1.1
825	D86-A	151.1		167.4		193.5		233.7		262.0		0.6	0.6
840	D86-A	145.85		170.03		194.57		235.59		261.89		1.2	0.9
875	D86-A	151.3		167.7		193.3		234.9		261.3		1.2	1.5
922	D86-A	152.4		170.0		194.2		235.1		263.4		1.4	0.4
962		-----		-----		-----		-----		-----		-----	-----
963		-----		-----		-----		-----		-----		-----	-----
970	D86-A	149.7		168.9		194.5		236.4		261.8		1.2	0.9
974	D86-A	150.3		169.5		195.1		237.4		260.8		1.2	1.0
998	D86-M	153.0		169.5		194.5		234.0		266.0		1.4	0.5
1039	ISO3405-A	151.5		165.8		194.3		234.5		263.4		1.0	0.3
1049	D86-A	151.3		168.8		193.8		235.6		263.4		1.2	0.6
1059	D86-A	150.4		169.6		193.7		234.4		262.2		1.2	0.4
1062	D86-A	148.2		169.2		193.8		234.4		260.0		1.2	0.5
1064	D86-A	150.9		169.1		194.1		236.2		262.4		1.1	0.8
1097	ISO3405-A	151.8		168.2		194.3		236.2		262.9		1.2	0.7
1108	D86-A	149.1		168.3		194.2		238.3		263.5		1.2	2.0
1109	D86-A	149.3		168.2		193.8		235.0		262.3		1.2	0.6
1126		148.8		169.1		196.7	R5	235.1		262.9		1.0	0
1191	D86-A	149.4		169.5		194.3		235.6		262.1		1.4 C	1.4
1212	D86-A	148.8		169.3		193.9		236.0		263.4		1.1	1.0
1284		150.1		167.6		193.0		235.2		264.0		1.2	1.1
1297	D86-A	148.7		169.2		193.5		234.7		261.0		1.2	0.7
1299	D86-A	152.7		170.0		194.3		236.4		261.4		1.2	0.8
1397		-----		-----		-----		-----		-----		-----	-----
1399	D86-A	150.2		167.6		193.3		237.4		261.2		1.2	1.0
1429	D86-A	149.1		167.5		192.1		231.9		259.5		1.0	0.1
1476	ISO3405-A	152.75		169.4		195.05		236.95		261.3		1.2	0.9
1498		151.7		168.4		194.5		236.2		264.5		1.2	0.9
1531	D86-A	149.8		168.5		194.0		235.1		264.5		1.0	0.14
1564	D86-A	148.3		167.9		193.1		233.9		260.6		1.2	0.6
1585	D86-A	149.7		169.3		193.8		234.8		261.5		1.2	1.0
1586	D86-A	150.9		169.2		194.2		236.0		262.4		1.2	0.6
1587	D86-A	149.5		168.9		193.9		234.1		262.7		1.2	0.3
1610	D86-A	153.5		169.4		194.6		236.4		263.9		1.3	0.8
1631	D86-A	148		168.5		194		234.6		264		1.2	0.8
1634	D86-A	148.2		168.8		194.0		234.9		262.3		1.2	0.1
1720	D86-A	150.3		169.1		194.5		235.2		263.7		1.2	0.3

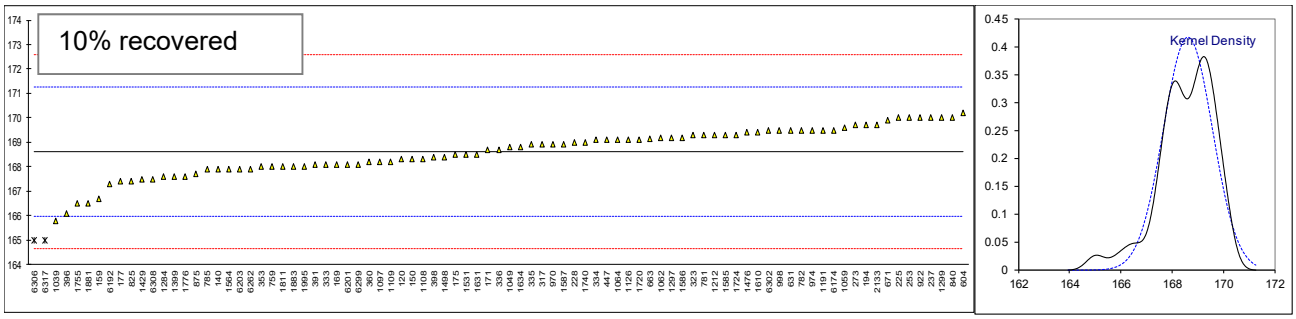
lab	method	IBP	m	10% rec	m	50% rec	m	90% rec	m	FBP	m	Res.	Loss
1724	D86-A	143.5	R5	169.3		193.2		233.9		262.1		1.6	0.4
1740	ISO3405-A	150.0		169.0		193.8		233.9		261		1.2	0.2
1755	D86-A	148.0		166.5		192.0		235.2		262.2		1.1	0.8
1757		-----		-----		-----		-----		-----		-----	-----
1776	ISO3405-A	146.0		167.6		193.6		236.3		258.9		1.2	1.3
1811	D86-A	149.8		168.0		193.0		232.8		261.0		0.4	0.2
1881	D86-A	146.7		166.5		192.7		234.0		262.8		1.0	0.1
1883	D86-M	150		168		194		234		258		1	1
1995	D86-A	151		168		194		234		256	R5	1.0	0
2133	D86-A	150.7		169.7		194.0		234.9		262.5		1.2	0.4
6075		-----		-----		-----		-----		-----		-----	-----
6142		-----		-----		-----		-----		-----		-----	-----
6154		-----		-----		-----		-----		-----		-----	-----
6174	D86-M	151.5		169.5		193.5		234.0		264.5		0.5	0.5
6192	D86	150		167.3		193.2		234.4		261.8		1.2	0.8
6201	D86-A	147.9		168.1		192.8		232.1		261.3		0.8	0.1
6203	D86-A	149.5		167.9		193.8		235.9		259.7		1.2	1.3
6238		-----		-----		-----		-----		-----		-----	-----
6262	D86-A	150.1		167.9		193.0		234.1		260.6		1.2	0.8
6299	ISO3405-A	149.9		168.1		193.6		233.2		260.5		1.2	0.0
6302	D86-A	154.93		169.47		194.83		236.21		264.12		1.1	0
6306	D86-A	148		165	R5	194		234		262		0.5	0.5
6308	IP123-A	150.8		167.5		192.1		234.1		260.7		1.4	0.7
6312		-----		-----		-----		-----		-----		-----	-----
6317	D86-M	148		165	R5	191	R5	231		260		1.2	0.8
normality		OK		OK		OK		OK		OK			
n		84		85		85		86		86			
outliers		3		2		2		1		1			
mean (n)		150.08		168.62		193.79		234.94		262.06			
st.dev. (n)		1.809		0.958		0.688		1.285		1.609			
R(calc.)		5.07		2.68		1.93		3.60		4.51			
st.dev.(D86-A:19)		2.948		1.325		1.071		1.259		2.536			
R(D86-A:19)		8.25		3.71		3.00		3.52		7.10			
Compare													
R(D86-M:19)		4.52		2.97		2.90		3.62		4.24			

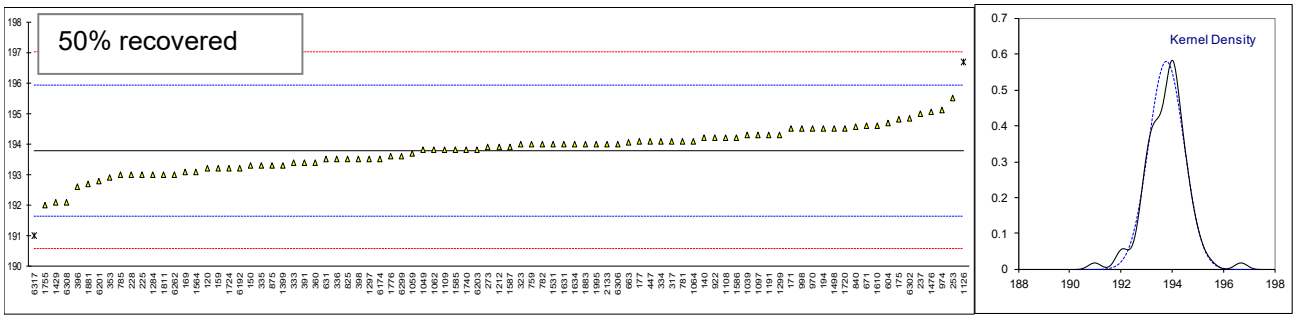
Lab 323 first reported 97.9
Lab 604 first reported 243.0
Lab 1191 first reported 98.2

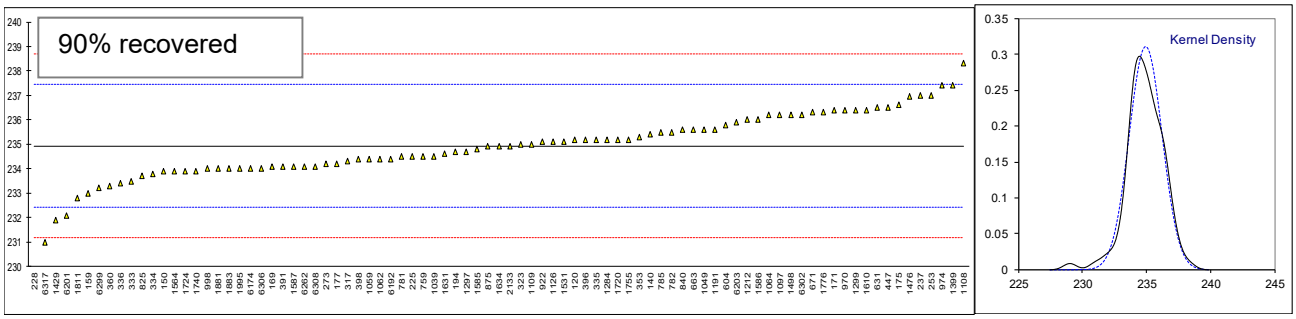
D86-A: automatic mode
D86-M: manual mode

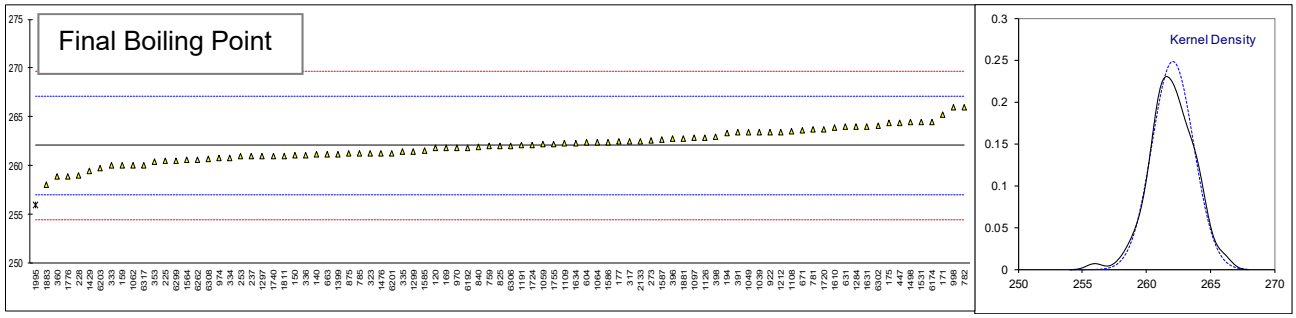
R1 and R5: respectively R(0.01) and R(0.05)


Initial Boiling Point
Kernel Density


10% recovered
Kernel Density


50% recovered
Kernel Density


90% recovered
Kernel Density


Final Boiling Point
Kernel Density

z-scores of the distillation determination

lab	IBP	10%rec	50%rec	90%rec	FBP
120	0.75	-0.24	-0.55	0.21	-0.10
140	-0.26	-0.54	0.38	0.37	-0.34
150	-0.20	-0.24	-0.46	-0.82	-0.38
159	-0.70	-1.45	-0.55	-1.54	-0.81
169	-0.43	-0.39	-0.65	-0.66	-0.10
171	0.31	0.06	0.66	1.16	1.24
175	-0.09	-0.09	0.94	1.32	0.92
177	-2.27	-0.92	0.29	-0.59	0.17
194	0.62	0.82	0.66	-0.19	0.49
225	-0.20	1.04	-0.74	-0.35	-0.62
228	-1.04	0.29	-0.74	-4.72	-1.21
237	0.99	1.04	1.13	1.64	-0.42
238	-----	-----	-----	-----	-----
253	0.31	1.04	1.59	1.64	-0.42
273	0.28	0.82	0.10	-0.59	0.21
317	-0.16	0.21	0.29	-0.51	0.17
323	-0.20	0.52	0.19	0.05	-0.30
333	-1.35	-0.39	-0.37	-1.14	-0.81
334	0.58	0.36	0.29	-0.90	-0.50
335	1.20	0.21	-0.46	0.21	-0.26
336	-0.20	0.06	-0.27	-1.22	-0.38
353	-0.50	-0.47	-0.83	0.29	-0.66
360	-2.20	-0.31	-0.37	-1.30	-1.25
391	-0.33	-0.39	-0.37	-0.66	0.53
396	0.75	-1.90	-1.11	0.21	0.29
398	-0.70	-0.16	-0.27	-0.43	0.37
399	-----	-----	-----	-----	-----
447	0.08	0.36	0.29	1.24	0.92
594	-----	-----	-----	-----	-----
604	0.01	1.19	0.85	0.69	0.13
631	0.82	0.67	-0.27	1.24	0.76
634	-----	-----	-----	-----	-----
663	-0.18	0.40	0.24	0.53	-0.34
671	1.30	0.97	0.75	1.08	0.61
759	-0.20	-0.47	0.19	-0.35	-0.03
781	-0.23	0.52	0.29	-0.35	0.65
782	0.48	0.67	0.19	0.45	1.55
785	0.04	-0.54	-0.74	0.45	-0.30
825	0.35	-0.92	-0.27	-0.98	-0.03
840	-1.43	1.07	0.73	0.52	-0.07
875	0.41	-0.69	-0.46	-0.03	-0.30
922	0.79	1.04	0.38	0.13	0.53
962	-----	-----	-----	-----	-----
963	-----	-----	-----	-----	-----
970	-0.13	0.21	0.66	1.16	-0.10
974	0.08	0.67	1.22	1.96	-0.50
998	0.99	0.67	0.66	-0.74	1.55
1039	0.48	-2.13	0.47	-0.35	0.53
1049	0.41	0.14	0.01	0.53	0.53
1059	0.11	0.74	-0.09	-0.43	0.05
1062	-0.64	0.44	0.01	-0.43	-0.81
1064	0.28	0.36	0.29	1.00	0.13
1097	0.58	-0.31	0.47	1.00	0.33
1108	-0.33	-0.24	0.38	2.67	0.57
1109	-0.26	-0.31	0.01	0.05	0.09
1126	-0.43	0.36	2.71	0.13	0.33
1191	-0.23	0.67	0.47	0.53	0.01
1212	-0.43	0.52	0.10	0.84	0.53
1284	0.01	-0.77	-0.74	0.21	0.76
1297	-0.47	0.44	-0.27	-0.19	-0.42
1299	0.89	1.04	0.47	1.16	-0.26
1397	-----	-----	-----	-----	-----
1399	0.04	-0.77	-0.46	1.96	-0.34
1429	-0.33	-0.84	-1.58	-2.41	-1.01
1476	0.91	0.59	1.17	1.60	-0.30
1498	0.55	-0.16	0.66	1.00	0.96
1531	-0.09	-0.09	0.19	0.13	0.96
1564	-0.60	-0.54	-0.65	-0.82	-0.58
1585	-0.13	0.52	0.01	-0.11	-0.22
1586	0.28	0.44	0.38	0.84	0.13
1587	-0.20	0.21	0.10	-0.66	0.25
1610	1.16	0.59	0.75	1.16	0.72
1631	-0.70	-0.09	0.19	-0.27	0.76
1634	-0.64	0.14	0.19	-0.03	0.09
1720	0.08	0.36	0.66	0.21	0.65

lab	IBP	10%rec	50%rec	90%rec	FBP
1724	-2.23	0.52	-0.55	-0.82	0.01
1740	-0.03	0.29	0.01	-0.82	-0.42
1755	-0.70	-1.60	-1.67	0.21	0.05
1757	-----	-----	-----	-----	-----
1776	-1.38	-0.77	-0.18	1.08	-1.25
1811	-0.09	-0.47	-0.74	-1.70	-0.42
1881	-1.15	-1.60	-1.02	-0.74	0.29
1883	-0.03	-0.47	0.19	-0.74	-1.60
1995	0.31	-0.47	0.19	-0.74	-2.39
2133	0.21	0.82	0.19	-0.03	0.17
6075	-----	-----	-----	-----	-----
6142	-----	-----	-----	-----	-----
6154	-----	-----	-----	-----	-----
6174	0.48	0.67	-0.27	-0.74	0.96
6192	-0.03	-0.99	-0.55	-0.43	-0.10
6201	-0.74	-0.39	-0.93	-2.25	-0.30
6203	-0.20	-0.54	0.01	0.77	-0.93
6238	-----	-----	-----	-----	-----
6262	0.01	-0.54	-0.74	-0.66	-0.58
6299	-0.06	-0.39	-0.18	-1.38	-0.62
6302	1.65	0.64	0.97	1.01	0.81
6306	-0.70	-2.73	0.19	-0.74	-0.03
6308	0.25	-0.84	-1.58	-0.66	-0.54
6312	-----	-----	-----	-----	-----
6317	-0.70	-2.73	-2.61	-3.13	-0.81

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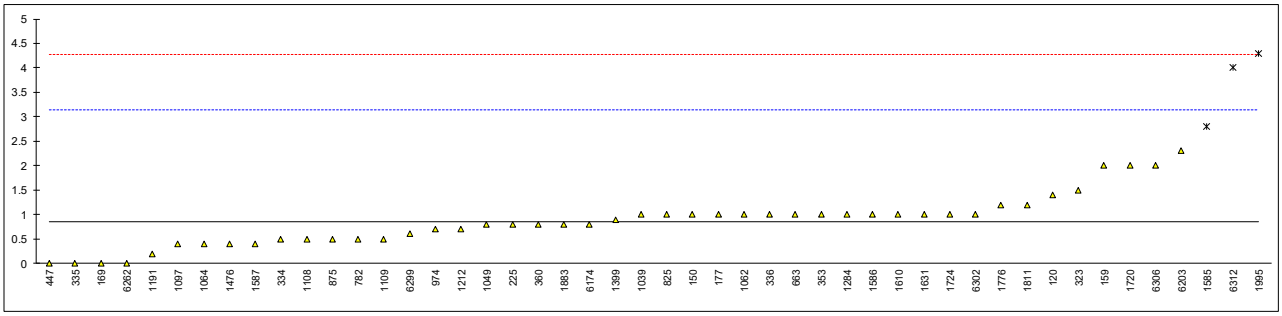
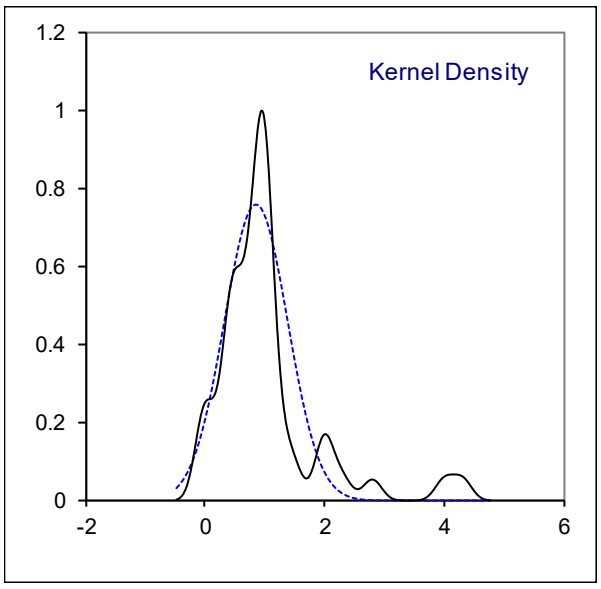
Determination of Existent Gum (unwashed) on sample #20020; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
120	D381	1.4		0.47	
140	D381	<1		-----	
150	D381	1		0.12	
159	D381	2		1.00	
169	D381	0.0		-0.76	
171	D381	<1		-----	
175		-----		-----	
177	D381	1.0		0.12	
194		-----		-----	
225	D381	0.8		-0.05	
228	D381	<1		-----	
237	D381	<1		-----	
238		-----		-----	
253	IP540	< 1.0		-----	
273	D381	<1		-----	
317	IP540	<1		-----	
323	D381	1.5		0.56	
333	D381	<0.5		-----	
334	D381	0.5		-0.32	
335	D381	0		-0.76	
336	D381	1.0		0.12	
353	IP540	1.0		0.12	
360	IP540	0.8		-0.05	
391		-----		-----	
396	D381	<1		-----	
398		-----		-----	
399	IP540	<1		-----	
447	D381	0		-0.76	
594		-----		-----	
604		-----		-----	
631	IP540	<1		-----	
634		-----		-----	
663	D381	1.0		0.12	
671	IP540	<0.5		-----	
759		-----		-----	
781		-----		-----	
782	D381	0.5		-0.32	
785		-----		-----	
825	D381	1		0.12	
840		-----		-----	
875	IP540	0.50		-0.32	
922	D381	<1.0		-----	
962		-----		-----	
963		-----		-----	
970	D381	<1		-----	
974	D381	0.7		-0.14	
998	D381	<1.0		-----	
1039	ISO6246	1		0.12	
1049	D381	0.8		-0.05	
1059	D381	<1		-----	
1062	D381	1.0		0.12	
1064	D381	0.4		-0.41	
1097	IP540	0.4		-0.41	
1108	D381	0.5		-0.32	
1109	IP540	0.5		-0.32	
1126		-----		-----	
1191	IP540	0.2		-0.58	
1212	IP540	0.7		-0.14	
1284	D381	1.0		0.12	
1297		-----		-----	
1299	D381	<1		-----	
1397		-----		-----	
1399	D381	0.9		0.03	
1429		-----		-----	
1476	ISO6246	0.4		-0.41	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	IP540	2.8	R(0.05)	1.71	
1586	IP540	1.0		0.12	
1587	IP540	0.4		-0.41	
1610	IP540	1		0.12	
1631	IP540	1		0.12	
1634	D381	<1		-----	
1720	D381	2.0		1.00	

lab	method	value	mark	z(targ)	remarks
1724	IP540	1.0		0.12	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776	IP540	1.2		0.30	
1811	D381	1.2		0.30	
1881		-----		-----	
1883	D381	0.8		-0.05	
1995	D381	4.3	R(0.01)	3.03	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	D381	0.8		-0.05	
6192		-----		-----	
6201	D381	<1		-----	
6203	D381	2.3		1.27	
6238		-----		-----	
6262	D381	0		-0.76	
6299	IP540	0.6		-0.23	
6302	D381	1.0		0.12	
6306	D381	2		1.00	
6308		-----		-----	
6312	IP540	4.0	R(0.01)	2.76	
6317		-----		-----	

normality	OK
n	45
outliers	3
mean (n)	0.862
st.dev. (n)	0.5267
R(calc.)	1.475
st.dev.(D381:19)	1.1364
R(D381:19)	3.182



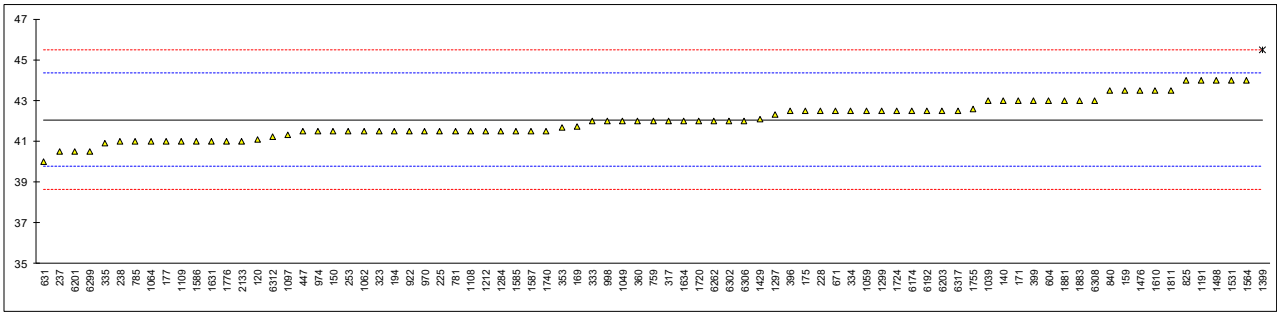


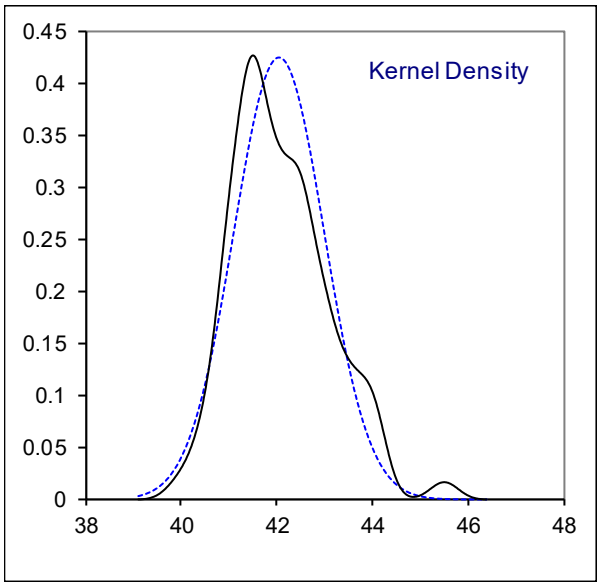
Determination of Flash Point on sample #20020; results in °C

lab	method	value	mark	z(targ)	remarks
120	D56	41.1		-0.84	
140	D56	43.0		0.83	
150	D56	41.5		-0.49	
159	D56	43.5		1.26	
169	D56	41.7		-0.31	
171	D56	43.0		0.83	
175	D56	42.5		0.39	
177	D56	41.0	C	-0.92	first reported 49.0
194	D93	41.5		-0.49	
225	IP170	41.5		-0.49	
228	IP170	42.5		0.39	
237	IP170	40.5		-1.36	
238	IP170	41.0		-0.92	
253	IP170	41.5		-0.49	
273		-----		-----	
317	IP170	42.0		-0.05	
323	IP170	41.5		-0.49	
333	IP170	42.0		-0.05	
334	IP170	42.5		0.39	
335	D93	40.9		-1.01	
336		-----		-----	
353	IP170	41.675		-0.33	
360	D56	42.0		-0.05	
391		-----		-----	
396	IP170	42.5		0.39	
398		-----		-----	
399	IP170	43		0.83	
447	IP170	41.5		-0.49	
594		-----		-----	
604	IP170	43.0		0.83	
631	D56	40.0		-1.80	
634		-----		-----	
663		-----		-----	
671	D93	42.5		0.39	
759	IP170	42.0		-0.05	
781	IP170	41.5		-0.49	
782		-----		-----	
785	IP170	41.0		-0.92	
825	IP170	44.0		1.70	
840	D3828	43.5		1.26	
875		-----		-----	
922	IP170	41.5		-0.49	
962		-----		-----	
963		-----		-----	
970	IP170	41.5		-0.49	
974	IP170	41.5		-0.49	
998	IP170	42.0		-0.05	
1039	IP170	43.0		0.83	
1049	ISO13736	42.0		-0.05	
1059	IP170	42.5		0.39	
1062	IP170	41.5		-0.49	
1064	IP170	41.0		-0.92	
1097	ISO13736	41.3		-0.66	
1108	D56	41.5		-0.49	
1109	IP170	41.0		-0.92	
1126		-----		-----	
1191	IP170	44		1.70	
1212	IP170	41.5		-0.49	
1284	IP170	41.5		-0.49	
1297	D56	42.3		0.21	
1299	IP170	42.5		0.39	
1397		-----		-----	
1399	IP170	45.5	R(0.05)	3.01	
1429	D56	42.1		0.04	
1476	ISO2719	43.5		1.26	
1498	D56	44.0		1.70	
1531	D93	44		1.70	
1564	IP170	44		1.70	
1585	IP170	41.5		-0.49	
1586	IP170	41.0		-0.92	
1587	IP170	41.5		-0.49	
1610	IP170	43.5		1.26	
1631	IP170	41		-0.92	
1634	IP170	42.0		-0.05	
1720	D3828	42.0		-0.05	

lab	method	value	mark	z(targ)	remarks
1724	IP170	42.5		0.39	
1740	IP170	41.5		-0.49	
1755	D56	42.6		0.48	
1757		-----		-----	
1776	IP170	41.0		-0.92	
1811	D56	43.5		1.26	
1881	D93	43.0		0.83	
1883	D3828	43		0.83	
1995		-----		-----	
2133	D93	41.0		-0.92	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	IP170	42.5		0.39	
6192	D93	42.5		0.39	
6201	IP170	40.5		-1.36	
6203	D3828	42.5		0.39	
6238		-----		-----	
6262	IP170	42.0		-0.05	
6299	ISO13736	40.5		-1.36	
6302	ISO13736	42.0		-0.05	
6306	IP170	42		-0.05	
6308	IP170	43.0		0.83	
6312	IP170	41.2		-0.75	
6317	ISO13736	42.5		0.39	

normality	OK
n	80
outliers	1
mean (n)	42.05
st.dev. (n)	0.940
R(calc.)	2.63
st.dev.(IP170:14)	1.143
R(IP170:14)	3.2



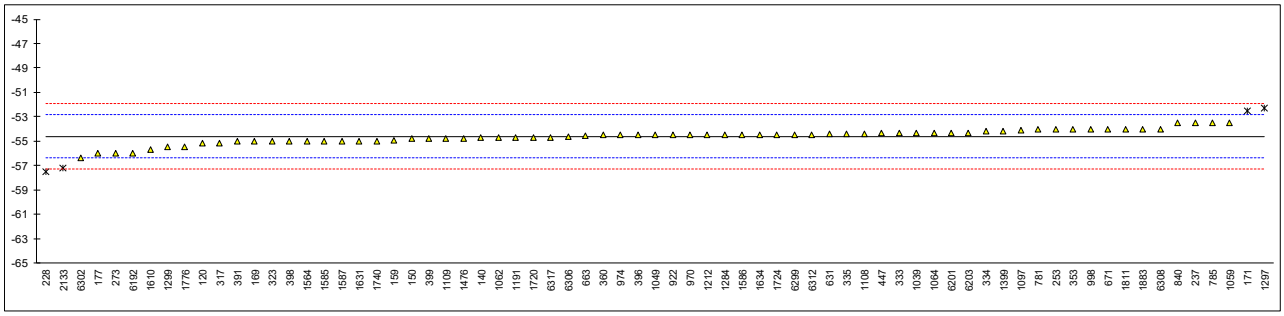


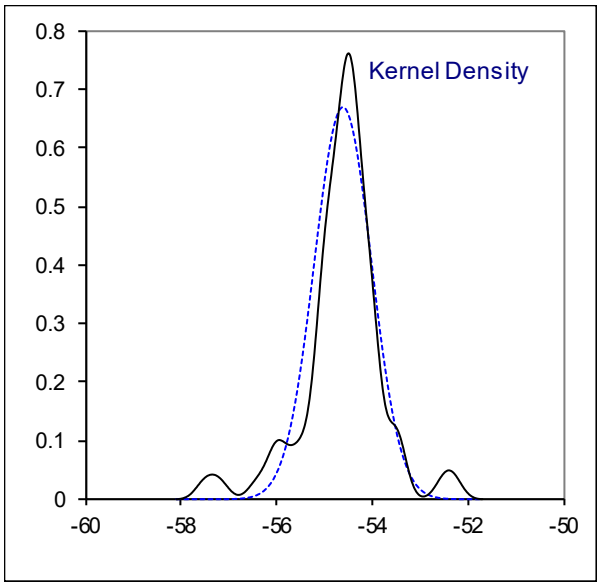
Determination of Freezing Point on sample #20020; results in °C

lab	method	value	mark	z(targ)	remarks
120	D5972	-55.2		-0.65	
140	D5972	-54.7		-0.09	
150	D7153	-54.8		-0.21	
159	D2386	-54.9	C	-0.32	first reported -57.5
169	D2386	-55		-0.43	
171	D2386	-52.5	R(0.05)	2.37	
175		-----		-----	
177	D2386	-56.0		-1.55	
194		-----		-----	
225		-----		-----	
228	D2386	-57.5	R(0.05)	-3.23	
237	D2386	-53.5		1.25	
238		-----		-----	
253	D2386	-54.0		0.69	
273	D2386	-56		-1.55	
317	D5972	-55.2		-0.65	
323	D2386	-55.0		-0.43	
333	IP529	-54.3		0.35	
334	D5972	-54.2		0.47	
335	IP529	-54.4		0.24	
336		-----		-----	
353	IP16	-54.0		0.69	
360	D2386	-54.5		0.13	
391	D2386	-55.0		-0.43	
396	D2386	-54.5		0.13	
398	D2386	-55.0		-0.43	
399	D7153	-54.8		-0.21	
447	IP529	-54.3		0.35	
594		-----		-----	
604		-----		-----	
631	D5972	-54.4		0.24	
634		-----		-----	
663	D2386	-54.58		0.04	
671	D2386	-54.0		0.69	
759		-----		-----	
781	D2386	-54.0		0.69	
782		-----		-----	
785	D2386	-53.5		1.25	
825		-----		-----	
840	D2386	-53.5		1.25	
875		-----		-----	
922	D2386	-54.5		0.13	
962		-----		-----	
963		-----		-----	
970	D2386	-54.5		0.13	
974	D2386	-54.5		0.13	
998	D2386	-54.0		0.69	
1039	IP529	-54.3		0.35	
1049	D7153	-54.5		0.13	
1059	D2386	-53.5		1.25	
1062	D2386	-54.7		-0.09	
1064	D7153	-54.3	C	0.35	first reported 54.3
1097	IP529	-54.1		0.58	
1108	D5972	-54.4		0.24	
1109	D5972	-54.8		-0.21	
1126		-----		-----	
1191	IP529	-54.7		-0.09	
1212	D2386	-54.5		0.13	
1284	D7153	-54.5		0.13	
1297	D5972	-52.3	R(0.05)	2.59	
1299	D2386	-55.5		-0.99	
1397		-----		-----	
1399	D7153	-54.2		0.47	
1429		-----		-----	
1476	D7153	-54.8		-0.21	
1498		-----		-----	
1531		-----		-----	
1564	D5972	-55		-0.43	
1585	D2386	-55.0		-0.43	
1586	D2386	-54.5		0.13	
1587	IP529	-55.0		-0.43	
1610	IP435	-55.7		-1.21	
1631	D2386	-55		-0.43	
1634	D2386	-54.5		0.13	
1720	D7153	-54.7		-0.09	

lab	method	value	mark	z(targ)	remarks
1724	IP435	-54.5		0.13	
1740	D2386	-55		-0.43	
1755		-----		-----	
1757		-----		-----	
1776	IP529	-55.5		-0.99	
1811	D2386	-54.0		0.69	
1881		-----		-----	
1883	D2386	-54		0.69	
1995		-----		-----	
2133	D7153	-57.2	R(0.05)	-2.89	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192	D2386	-56		-1.55	
6201	D7153	-54.3		0.35	
6203	D5972	-54.3		0.35	
6238		-----		-----	
6262		-----		-----	
6299	IP529	-54.5		0.13	
6302	D7153	-56.4		-2.00	
6306	D7153	-54.6		0.02	
6308	IP529	-54.0		0.69	
6312	IP529	-54.5		0.13	
6317	D5972	-54.7		-0.09	

normality	suspect
n	67
outliers	4
mean (n)	-54.62
st.dev. (n)	0.596
R(calc.)	1.67
st.dev.(D2386:19)	0.893
R(D2386:19)	2.5



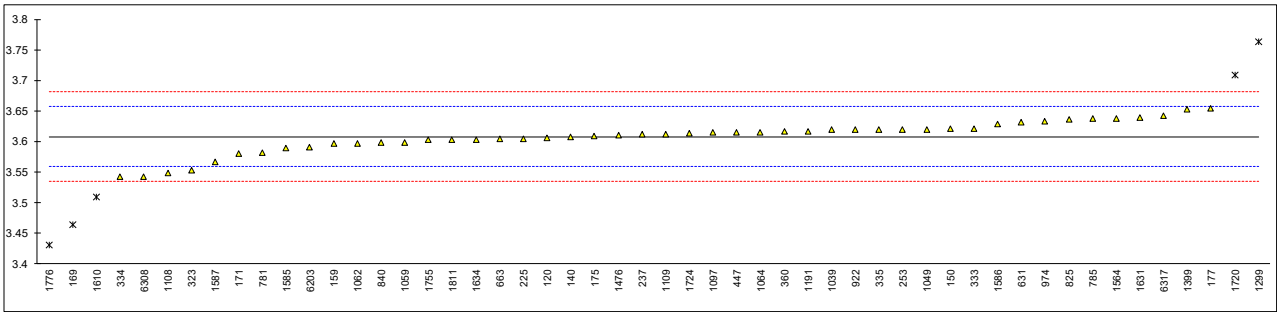


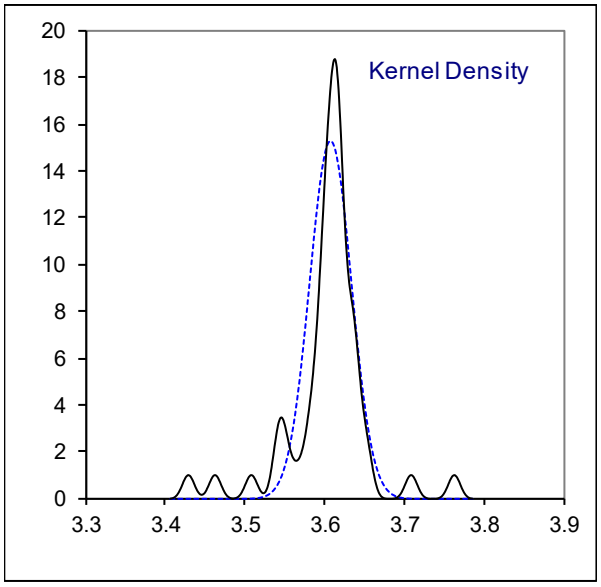
Determination of Kinematic Viscosity at -20°C on sample #20020; results in mm^2/s

lab	method	value	mark	z(targ)	remarks
120	D445	3.6057		-0.10	
140	D445	3.608		0.00	
150	D445	3.621		0.53	
159	D445	3.596		-0.49	
169	D445	3.4635	C,R(0.01)	-5.90	first reported 3.5181
171	D445	3.580		-1.15	
175	D445	3.609		0.04	
177	D445	3.654		1.88	
194		-----		-----	
225	D445	3.605		-0.13	
228		-----		-----	
237	D445	3.612		0.16	
238		-----		-----	
253	D445	3.620		0.49	
273		-----		-----	
317		-----		-----	
323	D445	3.553		-2.25	
333	D445	3.621		0.53	
334	D445	3.542		-2.70	
335	D445	3.620		0.49	
336		-----		-----	
353		-----		-----	
360	D445	3.616		0.32	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	D445	3.615		0.28	
594		-----		-----	
604		-----		-----	
631	D445	3.63199		0.98	
634		-----		-----	
663	D445	3.6044		-0.15	
671		-----		-----	
759		-----		-----	
781	D445	3.582		-1.06	
782		-----		-----	
785	D445	3.637		1.18	
825	D445	3.636		1.14	
840	D7042	3.5979		-0.42	
875		-----		-----	
922	D445	3.619		0.45	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974	D445	3.633		1.02	
998		-----		-----	
1039	D445	3.619		0.45	
1049	D445	3.620		0.49	
1059	D445	3.598		-0.41	
1062	D445	3.597		-0.45	
1064	D445	3.615		0.28	
1097	ISO3104	3.6144		0.26	
1108	D445	3.5485		-2.43	
1109	D445	3.6124		0.18	
1126		-----		-----	
1191	D445	3.61670757		0.35	
1212		-----		-----	
1284		-----		-----	
1297		-----		-----	
1299	D445	3.763	R(0.01)	6.33	
1397		-----		-----	
1399	D7042	3.6527		1.82	
1429		-----		-----	
1476	ISO3104	3.610		0.08	
1498		-----		-----	
1531		-----		-----	
1564	D445	3.6382		1.23	
1585	D445	3.5885		-0.80	
1586	D445	3.628		0.81	
1587	D445	3.56672		-1.69	
1610	D7042	3.509	R(0.05)	-4.05	
1631	D445	3.639		1.26	
1634	D445	3.603		-0.21	
1720	D445	3.709	C,R(0.05)	4.12	first reported 3.791

lab	method	value	mark	z(targ)	remarks
1724	D445	3.613		0.20	
1740		-----		-----	
1755	D445	3.6021		-0.24	
1757		-----		-----	
1776	D445	3.4302	R(0.01)	-7.26	
1811	D445	3.6029		-0.21	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201		-----		-----	
6203	D445	3.5901		-0.73	
6238		-----		-----	
6262		-----		-----	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308	D7042	3.543		-2.66	
6312		-----		-----	
6317	IP71	3.642		1.39	

normality	OK
n	47
outliers	5
mean (n)	3.6081
st.dev. (n)	0.02609
R(calc.)	0.0731
st.dev.(D445:19a)	0.02448
R(D445:19a)	0.0686



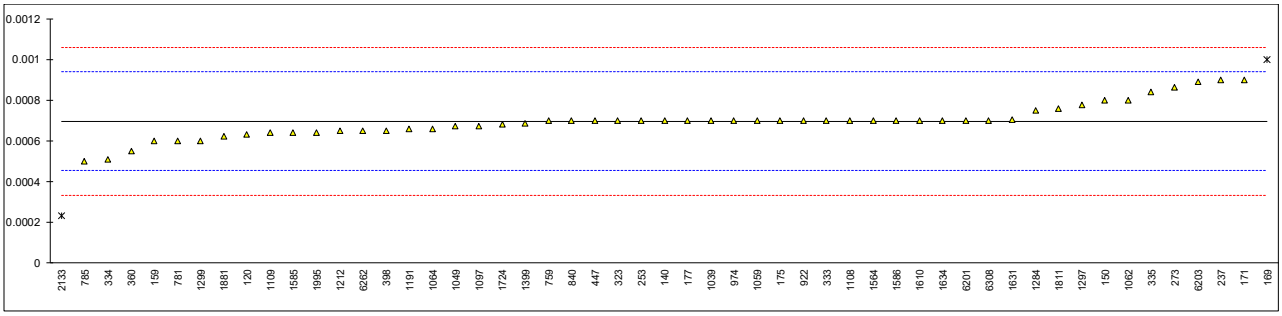


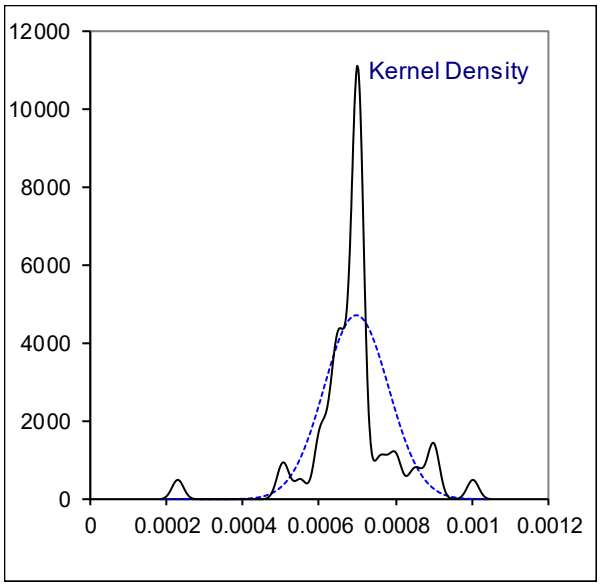
Determination of Mercaptan Sulfur as S on sample #20020; results in %M/M

lab	method	value	mark	z(targ)	remarks
120	UOP163	0.00063		-0.54	
140	D3227	0.0007		0.03	
150	D3227	0.0008		0.86	
159	D3227	0.0006	C	-0.79	first reported 0.0003
169	D3227	0.0010	R(0.05)	2.51	
171	D3227	0.0009		1.69	
175	D3227	0.0007		0.03	
177	D3227	0.0007		0.03	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237	D3227	0.0009	C	1.69	first reported 0.00012
238		-----		-----	
253	D3227	0.00070		0.03	
273	D3227	0.00086	C	1.36	first reported 0.000121
317		-----		-----	
323	D3227	0.0007		0.03	
333	D3227	0.0007		0.03	
334	D3227	0.00051		-1.53	
335	D3227	0.00084		1.19	
336		-----		-----	
353		-----		-----	
360	D3227	0.00055		-1.20	
391		-----		-----	
396		-----		-----	
398	D3227	0.000651		-0.37	
399		-----		-----	
447	D3227	0.0007		0.03	
594		-----		-----	
604		-----		-----	
631		-----		-----	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759	UOP163	0.0007		0.03	
781	D3227	0.0006		-0.79	
782		-----		-----	
785	UOP163	0.0005		-1.62	
825		-----		-----	
840	D3227	0.00070		0.03	
875		-----		-----	
922	D3227	0.00070		0.03	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974	D3227	0.0007		0.03	
998		-----		-----	
1039	IP342	0.0007		0.03	
1049	D3227	0.000670		-0.21	
1059	D3227	0.0007	C	0.03	first reported 0.0012
1062	D3227	0.0008		0.86	
1064	D3227	0.00066		-0.30	
1097	ISO3012	0.00067		-0.21	
1108	D3227	0.0007		0.03	
1109	D3227	0.00064		-0.46	
1126		-----		-----	
1191	ISO3012	0.000659		-0.30	
1212	D3227	0.00065		-0.38	
1284	D3227	0.000747		0.42	
1297	D3227	0.000777		0.67	
1299	D3227	0.0006		-0.79	
1397		-----		-----	
1399	D3227	0.000686		-0.08	
1429		-----		-----	
1476		-----		-----	
1498		-----		-----	
1531		-----		-----	
1564	D3227	0.0007	C	0.03	first reported 0.0011
1585	D3227	0.00064		-0.46	
1586	D3227	0.0007		0.03	
1587		-----		-----	
1610	IP342	0.0007		0.03	
1631	D3227	0.000705		0.08	
1634	D3227	0.0007		0.03	
1720		-----		-----	

lab	method	value	mark	z(targ)	remarks
1724	D3227	0.00068		-0.13	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D3227	0.00076		0.53	
1881	UOP163	0.00062		-0.63	
1883		-----		-----	
1995	UOP163	0.000641		-0.45	
2133	D3227	0.00023	R(0.01)	-3.84	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D3227	0.0007		0.03	
6203	D3227	0.00089		1.60	
6238		-----		-----	
6262	D3227	0.00065	C	-0.38	first reported 6.5 no unit
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308	IP342	0.0007		0.03	
6312		-----		-----	
6317		-----		-----	

normality	suspect
n	51
outliers	2
mean (n)	0.000696
st.dev. (n)	0.0000844
R(calc.)	0.000236
st.dev.(D3227:16)	0.0001212
R(D3227:16)	0.000339



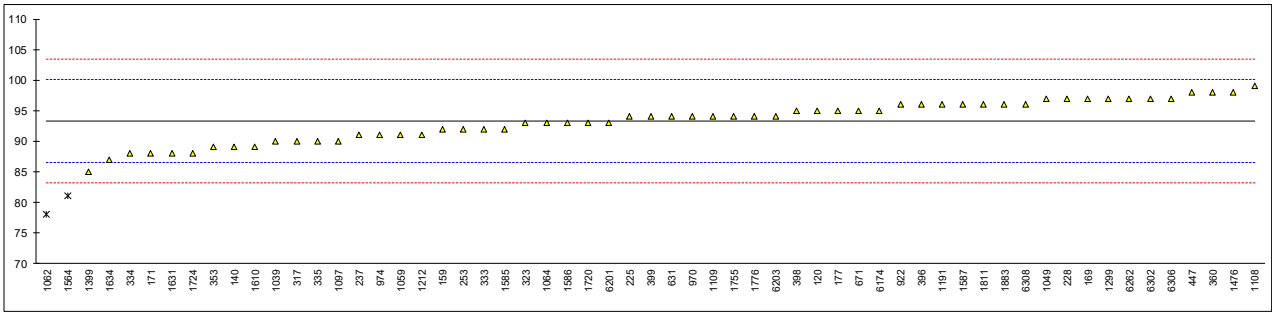


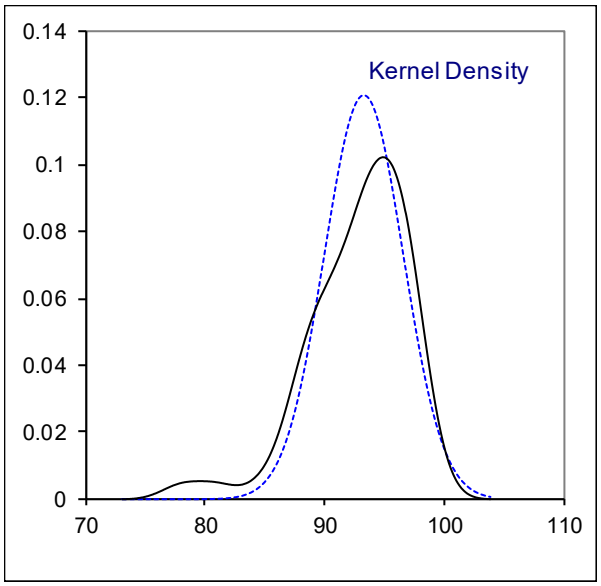
Determination of MSEP on sample #20020;

lab	method	value	mark	z(targ)	remarks
120	D3948	95		0.50	
140	D3948	89		-1.28	
150		-----		-----	
159	D3948	92		-0.39	
169	D3948	97		1.09	
171	D3948	88		-1.58	
175		-----		-----	
177	D3948	95		0.50	
194		-----		-----	
225	D3948	94		0.20	
228	D3948	97.0		1.09	
237	D3948	91		-0.69	
238		-----		-----	
253	D3948	92		-0.39	
273		-----		-----	
317	D7224	90		-0.98	
323	D3948	93		-0.09	
333	D7224	92		-0.39	
334	D7224	88		-1.58	
335	D7224	90		-0.98	
336		-----		-----	
353	D7224	89		-1.28	
360	D3948	98		1.39	
391		-----		-----	
396	D3948	96		0.80	
398	D3948	95		0.50	
399	D3948	94		0.20	
447	D3948	98		1.39	
594		-----		-----	
604		-----		-----	
631	D3948	94		0.20	
634		-----		-----	
663		-----		-----	
671	D3948	95		0.50	
759		-----		-----	
781		-----		-----	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840		-----		-----	
875		-----		-----	
922	D3948	96		0.80	
962		-----		-----	
963		-----		-----	
970	D3948	94		0.20	
974	D3948	91		-0.69	
998		-----		-----	
1039	D3948	90		-0.98	
1049	D3948	97		1.09	
1059	D3948	91		-0.69	
1062	D3948	78	R(0.01)	-4.54	
1064	D7224	93		-0.09	
1097	D3948	90		-0.98	
1108	D3948	99		1.69	
1109	D3948	94		0.20	
1126		-----		-----	
1191	D3948	96		0.80	
1212	D7224	91		-0.69	
1284		-----		-----	
1297		-----		-----	
1299	D3948	97		1.09	
1397		-----		-----	
1399	D3948	85		-2.47	
1429		-----		-----	
1476	In house	98		1.39	
1498		-----		-----	
1531		-----		-----	
1564	D3948	81	R(0.05)	-3.65	
1585	D3948	92		-0.39	
1586	D3948	93		-0.09	
1587	D3948	96		0.80	
1610	D3948	89		-1.28	
1631	D7224	88		-1.58	
1634	D7224	87		-1.87	
1720		93		-0.09	

lab	method	value	mark	z(targ)	remarks
1724	D3948	88		-1.58	
1740		-----		-----	
1755	D7224	94		0.20	
1757		-----		-----	
1776	D3948	94		0.20	
1811	D3948	96		0.80	
1881		-----		-----	
1883	D3948	96		0.80	
1995		-----		-----	
2133		-----		-----	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174	D3948	95		0.50	
6192		-----		-----	
6201	D3948	93		-0.09	
6203	D3948	94		0.20	
6238		-----		-----	
6262	D3948	97		1.09	
6299		-----		-----	
6302	D7224	97		1.09	
6306	D7224	97		1.09	
6308	D3948	96		0.80	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	57
outliers	2
mean (n)	93.32
st.dev. (n)	3.307
R(calc.)	9.26
st.dev.(D3948:14)	3.372
R(D3948:14)	9.44



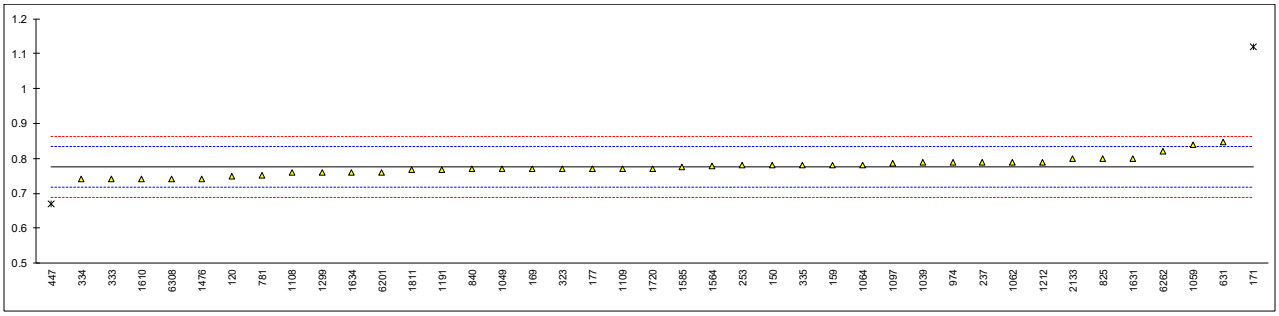


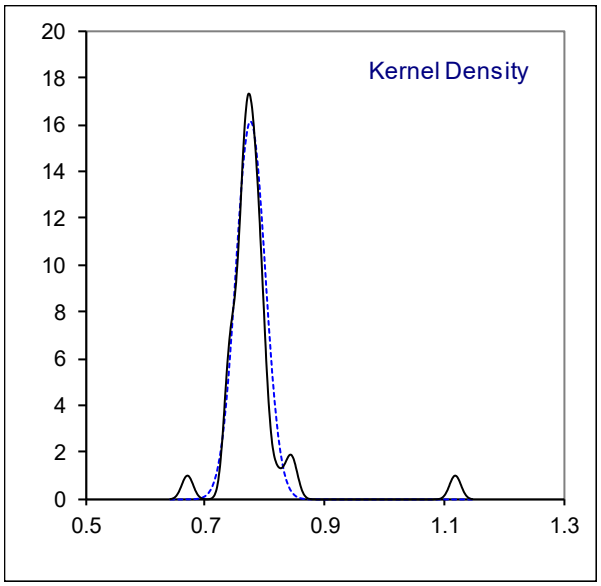
Determination of Naphthalenes on sample #20020; results in %V/V

lab	method	value	mark	z(targ)	remarks
120	D1840-B	0.749		-0.93	
140		-----		-----	
150	D1840-B	0.78		0.14	
159	D1840-B	0.78		0.14	
169	D1840-B	0.76936		-0.23	
171	D1840-B	1.12	R(0.01)	11.93	
175		-----		-----	
177	D1840-B	0.77		-0.21	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237	D1840-A	0.79		0.49	
238		-----		-----	
253	D1840-B	0.78		0.14	
273		-----		-----	
317		-----		-----	
323	D1840-A	0.77		-0.21	
333	D1840-B	0.74		-1.25	
334	D1840-B	0.74		-1.25	
335	D1840-B	0.78	C	0.14	first reported 0.68
336		-----		-----	
353		-----		-----	
360		-----		-----	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	D1840-B	0.67	R(0.01)	-3.67	
594		-----		-----	
604		-----		-----	
631	D1840-A	0.848		2.50	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D1840-B	0.753		-0.80	
782		-----		-----	
785		-----		-----	
825	D1840-B	0.80		0.83	
840	D1840-B	0.769		-0.24	
875		-----		-----	
922		-----		-----	
962		-----		-----	
963		-----		-----	
970		-----		-----	
974	D1840-A	0.79		0.49	
998		-----		-----	
1039	D1840-B	0.79		0.49	
1049	D1840-A	0.769		-0.24	
1059	D1840-B	0.84		2.22	
1062	D1840-A	0.79		0.49	
1064	D1840-A	0.780		0.14	
1097	D1840-A	0.786		0.35	
1108	D1840-B	0.76		-0.55	
1109	D1840-B	0.77		-0.21	
1126		-----		-----	
1191	D1840-B	0.76693		-0.31	
1212	D1840-B	0.79		0.49	
1284		-----		-----	
1297		-----		-----	
1299	D1840-A	0.76		-0.55	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476	D1840-B	0.7415		-1.19	
1498		-----		-----	
1531		-----		-----	
1564	D1840-A	0.7793		0.12	
1585	D1840-B	0.775		-0.03	
1586		-----		-----	
1587		-----		-----	
1610	D1840-B	0.74		-1.25	
1631	D1840-B	0.80		0.83	
1634	D1840-B	0.76		-0.55	
1720	D1840-B	0.77		-0.21	

lab	method	value	mark	z(targ)	remarks
1724		-----		-----	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776		-----		-----	
1811	D1840-A	0.7664		-0.33	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133	D1840-A	0.799	C	0.80	first reported 0.080
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D1840-B	0.76		-0.55	
6203		-----		-----	
6238		-----		-----	
6262	D1840-A	0.82		1.53	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308	D1840-B	0.74		-1.25	
6312		-----		-----	
6317		-----		-----	

			only D1840-A	only D1840-B
	normality	suspect	not OK	not OK
	n	39	13	26
	outliers	2	0	2
	mean (n)	0.7759	0.7883	0.7698
	st.dev. (n)	0.02470	0.02387	0.02313
	R(calc.)	0.0692	0.0668	0.0648
	st.dev.(D1840-B:07)	0.02883	---	0.02883
	R(D1840-B:07)	0.0807	---	0.0803
Compare				
	R(D1840-A:07)	0.0531	0.0535	---



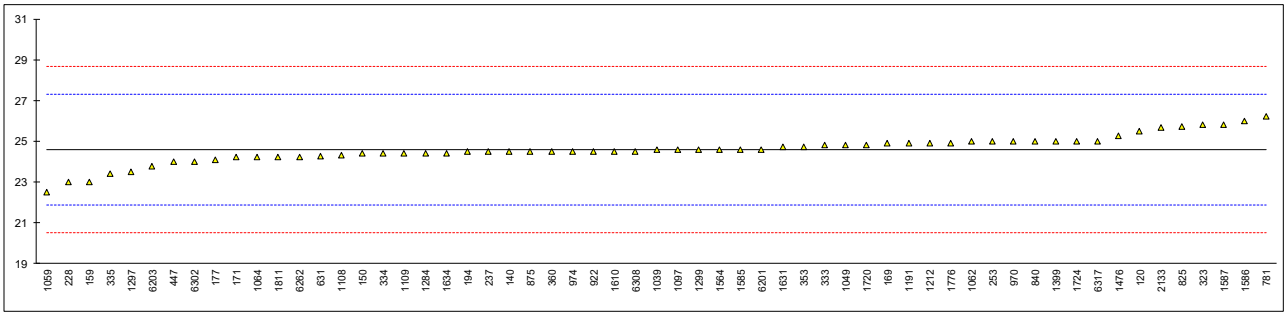


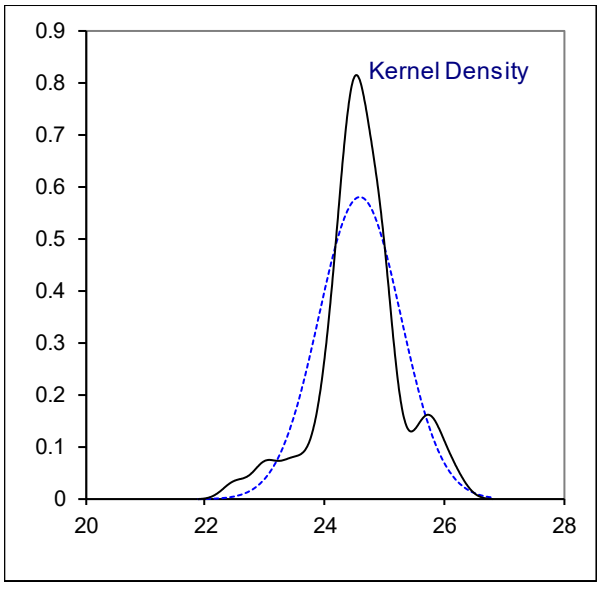
Determination of Smoke Point on sample #20020; results in mm

lab	method	value	mark	z(targ)	remarks
120	D1322-automated	25.5		0.67	
140	D1322-automated	24.5		-0.07	
150	D1322-automated	24.4		-0.14	
159	D1322-automated	23.0		-1.17	
169	D1322-automated	24.9		0.22	
171	D1322-automated	24.2		-0.29	
175		-----		-----	
177	D1322-automated	24.1		-0.36	
194	D1322-manual	24.5		-0.07	
225		-----		-----	
228	D1322-automated	23.0		-1.17	
237	D1322-automated	24.5		-0.07	
238		-----		-----	
253	D1322-manual	25		0.30	
273		-----		-----	
317		-----		-----	
323	D1322-automated	25.8		0.89	
333	D1322-automated	24.8		0.15	
334	D1322-automated	24.4		-0.14	
335	D1322-manual	23.4		-0.88	
336		-----		-----	
353	IP57-manual	24.72		0.09	
360	D1322-manual	24.5		-0.07	
391		-----		-----	
396		-----		-----	
398		-----		-----	
399		-----		-----	
447	D1322-manual	24.0		-0.44	
594		-----		-----	
604		-----		-----	
631	D1322-automated	24.25		-0.25	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D1322-manual	26.2		1.18	
782		-----		-----	
785		-----		-----	
825	D1322-manual	25.7		0.81	
840	D1322-manual	25.0		0.30	
875	D1322-manual	24.5		-0.07	
922	D1322-manual	24.5		-0.07	
962		-----		-----	
963		-----		-----	
970	D1322-manual	25.0		0.30	
974	D1322-automated	24.5		-0.07	
998		-----		-----	
1039	D1322-automated	24.6		0.00	
1049	D1322-automated	24.8		0.15	
1059	D1322-manual	22.5		-1.54	
1062	D1322-manual	25.0		0.30	
1064	D1322-automated	24.2		-0.29	
1097	D1322-automated	24.6		0.00	
1108	D1322-automated	24.3		-0.22	
1109	D1322-automated	24.4		-0.14	
1126		-----		-----	
1191	D1322-automated	24.9		0.22	
1212	D1322-manual	24.9		0.22	
1284	D1322-automated	24.4		-0.14	
1297	D1322-manual	23.5		-0.81	
1299	D1322-automated	24.6		0.00	
1397		-----		-----	
1399	D1322-automated	25		0.30	
1429		-----		-----	
1476	D1322-automated	25.25		0.48	
1498		-----		-----	
1531		-----		-----	
1564	D1322-automated	24.6		0.00	
1585	D1322-automated	24.6		0.00	
1586	D1322-manual	26		1.04	
1587	D1322-automated	25.8		0.89	
1610	IP598-manual	24.5		-0.07	
1631	D1322-automated	24.7		0.08	
1634	D1322-automated	24.4		-0.14	
1720	D1322-automated	24.8		0.15	

lab	method	value	mark	z(targ)	remarks
1724	D1322-manual	25		0.30	
1740		-----		-----	
1755		-----		-----	
1757		-----		-----	
1776	D1322-automated	24.9		0.22	
1811	D1322-automated	24.2		-0.29	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133	D1322-manual	25.67		0.79	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D1322-automated	24.6		0.00	
6203	D1322-manual	23.79		-0.59	
6238		-----		-----	
6262	D1322-automated	24.2		-0.29	
6299		-----		-----	
6302	D1322-manual	24		-0.44	
6306		-----		-----	
6308	IP598-automated	24.5		-0.07	
6312		-----		-----	
6317	D1322-manual	25		0.30	

			only Manual	only Automated
	normality	suspect	OK	not OK
	n	59	23	36
	outliers	0	0	0
	mean (n)	24.59	24.65	24.56
	st.dev. (n)	0.689	0.863	0.563
	R(calc.)	1.93	2.42	1.58
	st.dev.(D1322-M:19)	1.357	1.357	---
	R(D1322-M:19)	3.80	3.81	---
Compare				
	R(D1322-A:19)	0.90	---	0.90



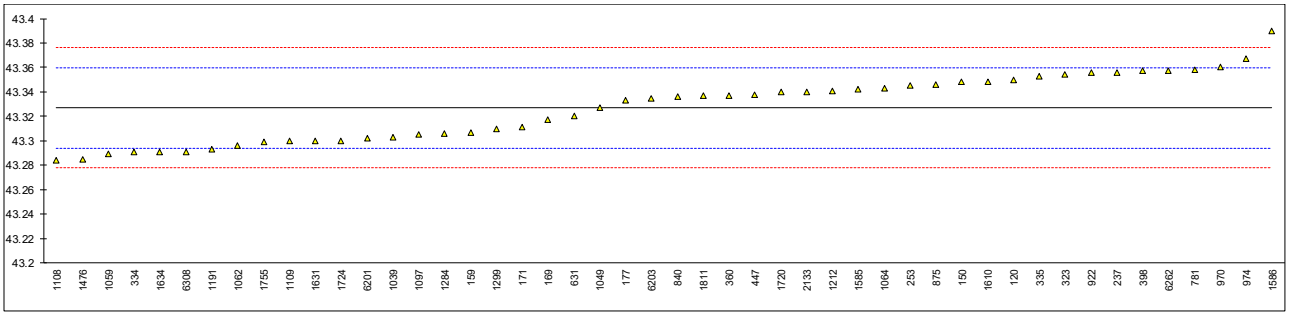


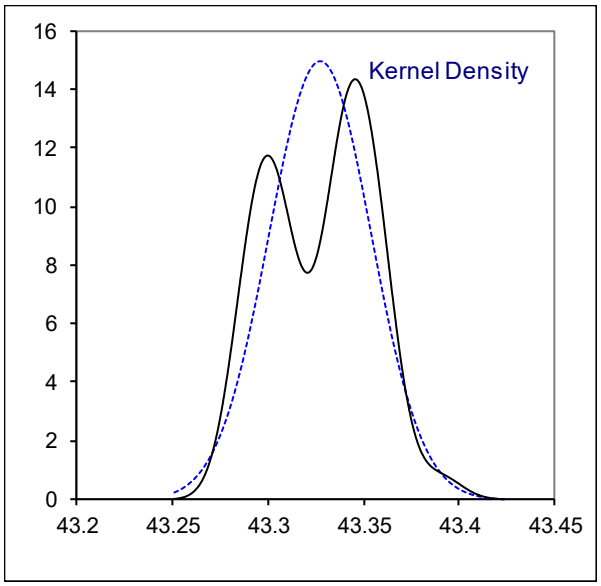
Determination of Specific Energy (Net) on Sulfur free basis on sample #20020; results in MJ/kg

lab	method	value	mark	z(targ)	remarks
120	D3338	43.350		1.40	
140		-----		-----	
150	D3338	43.348		1.28	
159	D3338	43.307	C	-1.22	first reported 43.211
169	D3338	43.317	C	-0.61	first reported 43.053
171	D3338	43.311		-0.97	
175		-----		-----	
177	D3338	43.333		0.37	
194		-----		-----	
225		-----		-----	
228		-----		-----	
237	D3338	43.356		1.77	
238		-----		-----	
253	D3338	43.3454		1.12	
273		-----		-----	
317		-----		-----	
323	D3338	43.354		1.64	
333		-----		-----	
334	D3338	43.291		-2.19	
335	D3338	43.353		1.58	
336		-----		-----	
353		-----		-----	
360	D3338	43.337		0.61	
391		-----		-----	
396		-----		-----	
398	D3338	43.357		1.83	
399		-----		-----	
447	D3338	43.338		0.67	
594		-----		-----	
604		-----		-----	
631	D3338	43.32049		-0.40	
634		-----		-----	
663		-----		-----	
671		-----		-----	
759		-----		-----	
781	D3338	43.358		1.89	
782		-----		-----	
785		-----		-----	
825		-----		-----	
840	D3338	43.3362		0.56	
875	D3338	43.346		1.16	
922	D3338	43.3559		1.76	
962		-----		-----	
963		-----		-----	
970	D3338	43.36		2.01	
974	D3338	43.367		2.44	
998		-----		-----	
1039	D3338	43.303		-1.46	
1049	D3338	43.32714		0.01	
1059	D3338	43.289		-2.31	
1062	D3338	43.296		-1.89	
1064	D3338	43.343		0.98	
1097	D3338	43.305		-1.34	
1108	D3338	43.284		-2.62	
1109	D3338	43.30		-1.64	
1126		-----		-----	
1191	D3338	43.2927397		-2.08	
1212	D3338	43.341		0.85	
1284	D3338	43.306		-1.28	
1297		-----		-----	
1299	D3338	43.31		-1.03	
1397		-----		-----	
1399		-----		-----	
1429		-----		-----	
1476	D3338	43.285		-2.56	
1498		-----		-----	
1531		-----		-----	
1564		-----		-----	
1585	D3338	43.342		0.91	
1586	D3338	43.39		3.84	
1587		-----		-----	
1610	D3338	43.348		1.28	
1631	D3338	43.3		-1.64	
1634	D3338	43.291	C	-2.19	first reported 43291
1720	D3338	43.34		0.79	

lab	method	value	mark	z(targ)	remarks
1724	D3338	43.30		-1.64	
1740		-----		-----	
1755	D4529	43.299		-1.70	
1757		-----		-----	
1776		-----		-----	
1811	D3338	43.3368		0.60	
1881		-----		-----	
1883		-----		-----	
1995		-----		-----	
2133	D3338	43.3403		0.81	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D3338	43.302		-1.52	
6203	D3338	43.335		0.49	
6238		-----		-----	
6262	D3338	43.357		1.83	
6299		-----		-----	
6302		-----		-----	
6306		-----		-----	
6308	D3338	43.291		-2.19	
6312		-----		-----	
6317		-----		-----	

normality	OK
n	48
outliers	0
mean (n)	43.3270
st.dev. (n)	0.02666
R(calc.)	0.0746
st.dev.(D3338:09e2)	0.01643
R(D3338:09e2)	0.0460



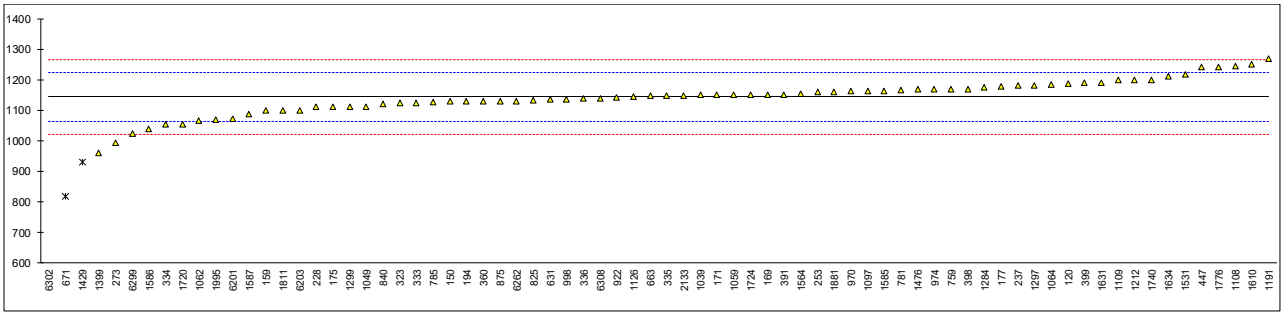


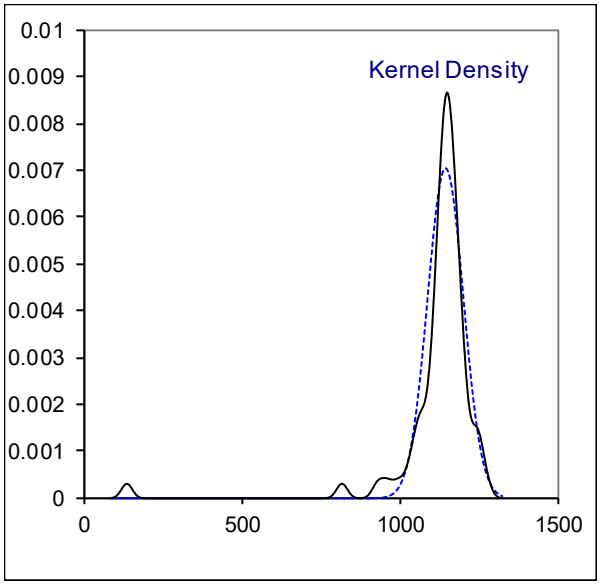
Determination of Total Sulfur on sample #20020; results in mg/kg

lab	method	value	mark	z(targ)	remarks
120	D4294	1185.8		1.05	
140		-----		-----	
150	D4294	1130		-0.32	
159	D4294	1100		-1.06	
169	D2622	1152		0.22	
171	D4294	1150		0.17	
175	D4294	1110		-0.81	
177	D4294	1179.0	C	0.88	first reported 0.1179 mg/kg
194	D4294	1130		-0.32	
225		-----		-----	
228	D4294	1110	C	-0.81	reported 0.111 mg/kg
237	D4294	1180		0.91	
238		-----		-----	
253	D4294	1160		0.41	
273	D5453	994	C	-3.66	first reported 904
317		-----		-----	
323	D4294	1122		-0.52	
333	D4294	1124		-0.47	
334	ISO20846	1053		-2.21	
335	D4294	1148	C	0.12	first reported 0.1148 mg/kg
336	ISO8754	1140	C	-0.08	first reported 0.114 mg/kg
353		-----		-----	
360	D5453	1130		-0.32	
391	D5453	1152		0.22	
396		-----		-----	
398	D5453	1170		0.66	
399	D4294	1190		1.15	
447	IP336	1240		2.38	
594		-----		-----	
604		-----		-----	
631	D4294	1134.47		-0.21	
634		-----		-----	
663	D5453	1147	C	0.10	first reported 951.2
671	D5453	817.19	C,R(0.01)	-8.01	first reported 843.47
759	D4294	1170		0.66	
781	D4294	1165		0.54	
782		-----		-----	
785	D4294	1126		-0.42	
825	D4294	1133		-0.25	
840	D5453	1120.1		-0.57	
875	D4294	1130		-0.32	
922	D4294	1142		-0.03	
962		-----		-----	
963		-----		-----	
970	D4294	1162		0.46	
974	D4294	1170		0.66	
998	D4294	1136		-0.17	
1039	ISO20884	1150		0.17	
1049	D5453	1111.6		-0.77	
1059	ISO14596	1150	C	0.17	first reported 0.115 mg/kg
1062	D5453	1066	C	-1.89	reported 0.1066 mg/kg
1064	D5453	1184.75		1.02	
1097	D5453	1162.98		0.49	
1108	D4294	1245		2.50	
1109	D2622	1197.7		1.34	
1126	ISO20846	1144		0.02	
1191	D4294	1270	C	3.12	first reported 0.127
1212	ISO8754	1200		1.40	
1284	D5453	1175		0.78	
1297	D4294	1180		0.91	
1299	D2622	1110		-0.81	
1397		-----		-----	
1399	D2622	960.0		-4.50	
1429	D5453	930	R(0.05)	-5.24	
1476	D2622	1167.5		0.60	
1498		-----		-----	
1531	ISO20846	1218.10		1.84	
1564	ISO20846	1154		0.27	
1585	D4294	1163		0.49	
1586	D5453	1040		-2.53	
1587	D4294	1086		-1.40	
1610	IP336	1250		2.63	
1631	IP336	1190		1.15	
1634	D5453	1210		1.64	
1720	D5453	1055.2		-2.16	

lab	method	value	mark	z(targ)	remarks
1724	IP336	1150		0.17	
1740	ISO8754	1200		1.40	
1755		-----		-----	
1757		-----		-----	
1776	ISO20846	1240		2.38	
1811	D5453	1100		-1.06	
1881	D5453	1160		0.41	
1883		-----		-----	
1995	D4294	1070	C	-1.80	reported 0.107 mg/kg
2133	D4294	1148.2		0.13	
6075		-----		-----	
6142		-----		-----	
6154		-----		-----	
6174		-----		-----	
6192		-----		-----	
6201	D5453	1071.4		-1.76	
6203	D2622	1100		-1.06	
6238		-----		-----	
6262	D2622	1130	C	-0.32	first reported 0.113 mg/kg
6299	D5453	1025		-2.90	
6302	D5453	140	C,R(0.01)	-24.65	first reported 1400
6306		-----		-----	
6308	IP336	1140	C	-0.08	first reported 0.114 mg/kg
6312		-----		-----	
6317		-----		-----	

normality	suspect
n	71
outliers	3
mean (n)	1143.11
st.dev. (n)	56.467
R(calc.)	158.11
st.dev.(D5453:19)	40.702
R(D5453:19)	113.96



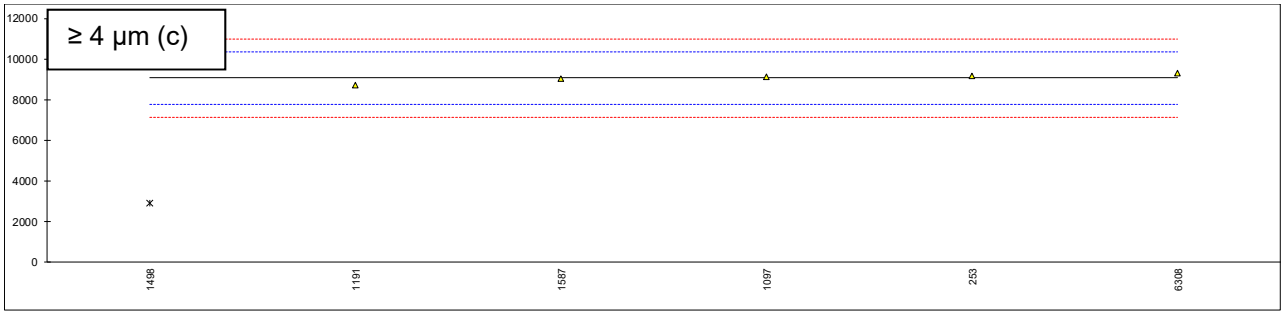


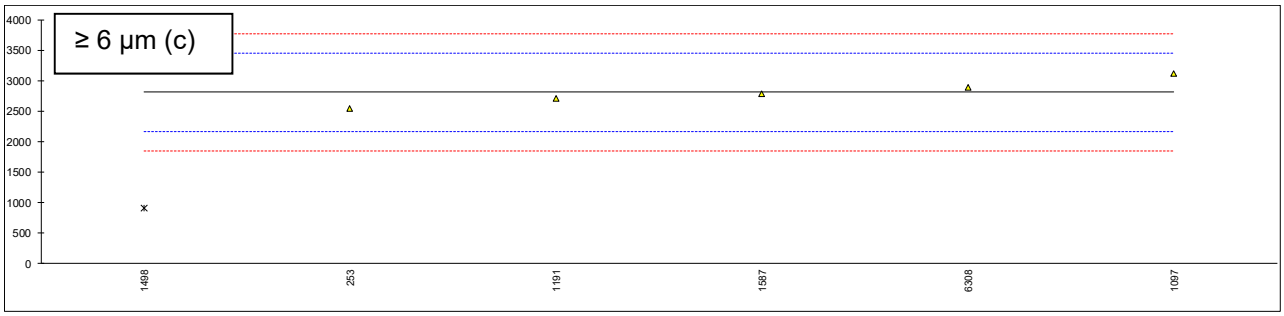
Determination of Particle Size Distribution on sample #20021 acc. to IP564, results in counts/mL

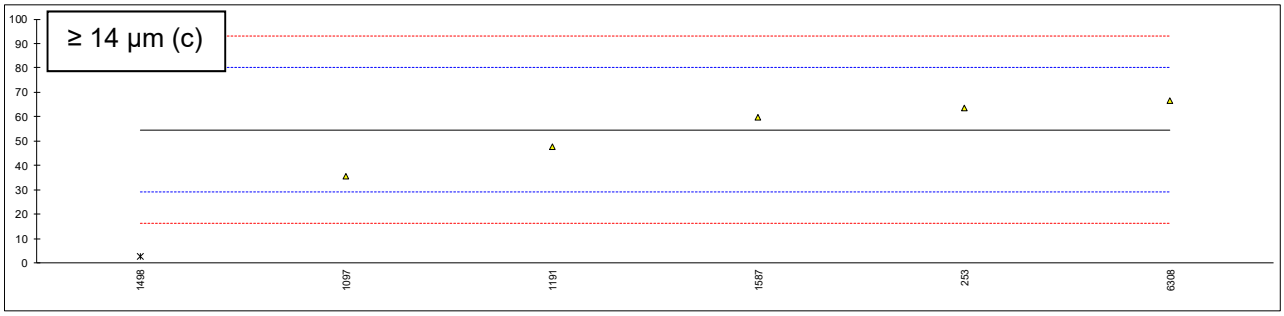
lab	method	≥4 µm (c)	m	≥6 µm (c)	m	≥14 µm (c)	m	≥21 µm (c)	m	≥25 µm (c)	m	≥30 µm (c)	m
140		-----		-----		-----		-----		-----		-----	
150		-----		-----		-----		-----		-----		-----	
171		-----		-----		-----		-----		-----		-----	
225		-----		-----		-----		-----		-----		-----	
237		-----		-----		-----		-----		-----		-----	
253	IP564	9151.3		2546.2		63.5		7.9		3.2		0.9	
323		-----		-----		-----		-----		-----		-----	
333		-----		-----		-----		-----		-----		-----	
334		-----		-----		-----		-----		-----		-----	
335		-----		-----		-----		-----		-----		-----	
360		-----		-----		-----		-----		-----		-----	
447		-----		-----		-----		-----		-----		-----	
781		-----		-----		-----		-----		-----		-----	
825		-----		-----		-----		-----		-----		-----	
840		-----		-----		-----		-----		-----		-----	
922		-----		-----		-----		-----		-----		-----	
963		-----		-----		-----		-----		-----		-----	
970		-----		-----		-----		-----		-----		-----	
974		-----		-----		-----		-----		-----		-----	
1039		-----		-----		-----		-----		-----		-----	
1059		-----		-----		-----		-----		-----		-----	
1062		-----		-----		-----		-----		-----		-----	
1064		-----		-----		-----		-----		-----		-----	
1097	IP564	9133.4		3108.9		35.6		4.1		1.7		0.5	
1108		-----		-----		-----		-----		-----		-----	
1109		-----		-----		-----		-----		-----		-----	
1191	IP564	8710		2710		47.8		8.7		3.4		0.7	
1212		-----		-----		-----		-----		-----		-----	
1299		-----		-----		-----		-----		-----		-----	
1397		-----		-----		-----		-----		-----		-----	
1498		2897.9	G1	903.7	G1	2.8	ex	0.4	ex	0.1	ex	0.1	ex
1564		-----		-----		-----		-----		-----		-----	
1585		-----		-----		-----		-----		-----		-----	
1587	IP564	9016.6		2788.0		59.7		13.6		6.9		2.1	
1610		-----		-----		-----		-----		-----		-----	
1631		-----		-----		-----		-----		-----		-----	
1634		-----		-----		-----		-----		-----		-----	
1724		-----		-----		-----		-----		-----		-----	
6075		-----		-----		-----		-----		-----		-----	
6201		-----		-----		-----		-----		-----		-----	
6203		-----		-----		-----		-----		-----		-----	
6238		-----		-----		-----		-----		-----		-----	
6262		-----		-----		-----		-----		-----		-----	
6308	IP564	9310.5		2891.2		66.7		10.5		4.1		0.9	
normality		unknown		unknown		unknown		unknown		unknown		unknown	
n		5		5		5		5		5		5	
outliers		1		1		0+(1ex)		0+(1ex)		0+(1ex)		0+(1ex)	
mean (n)		9064		2808.9		54.66		8.96		3.86		1.02	
st.dev. (n)		224.0		209.76		12.834		3.490		1.911		0.626	
R(calc.)		627		587.3		35.94		9.77		5.35		1.75	
st.dev.(IP564:13)		642.7		319.44		11.426		4.058		1.846		0.603	
R(IP564:13)		1800		894.4		35.89		11.36		5.17		1.69	

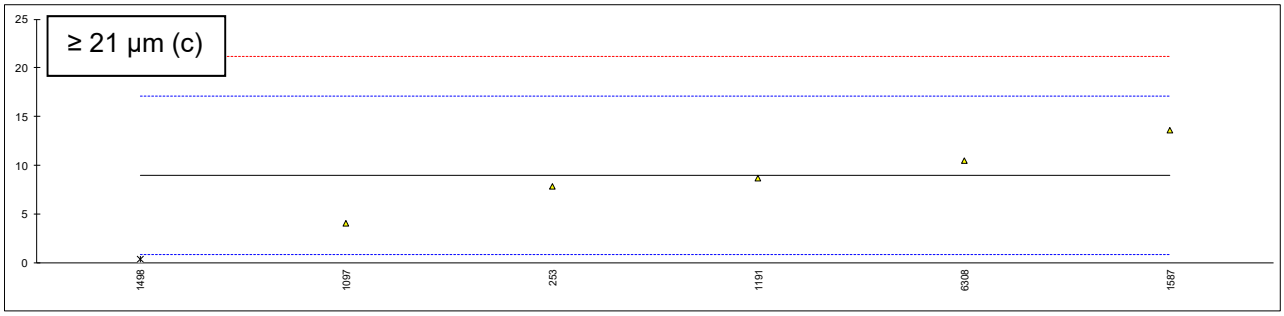
Lab 1498 test results excluded, there were two outliers in related test results

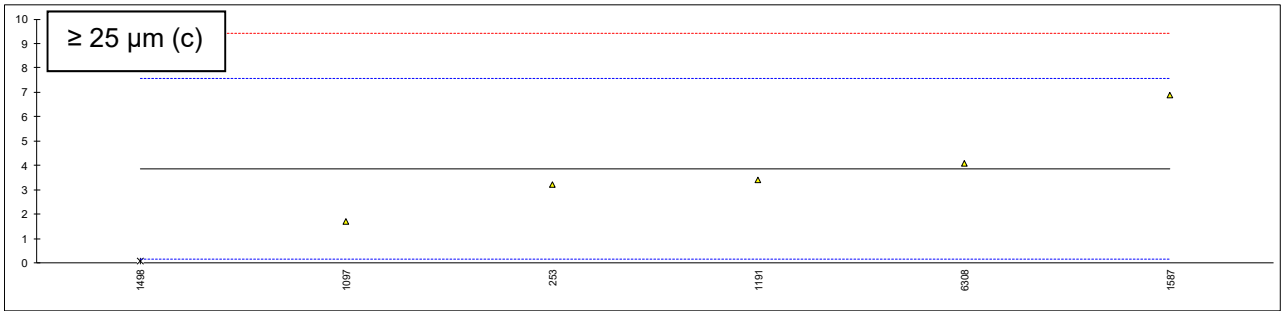
G1 = G(0.01)

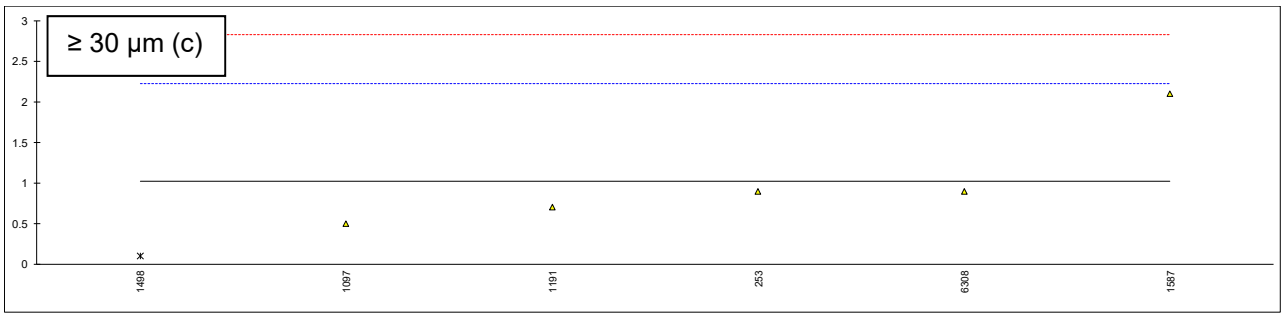

≥ 4 µm (c)
12000
10000
8000
6000
4000
2000
0
1498
1191
1587
1097
253
6308


≥ 6 µm (c)
4000
3500
3000
2500
2000
1500
1000
500
0
1498
253
1191
1587
6308
1097


≥ 14 µm (c)
100
90
80
70
60
50
40
30
20
10
0
1498
1097
1191
1587
253
6308


≥ 21 µm (c)
25
20
15
10
5
0
1498
1097
253
1191
6308
1587

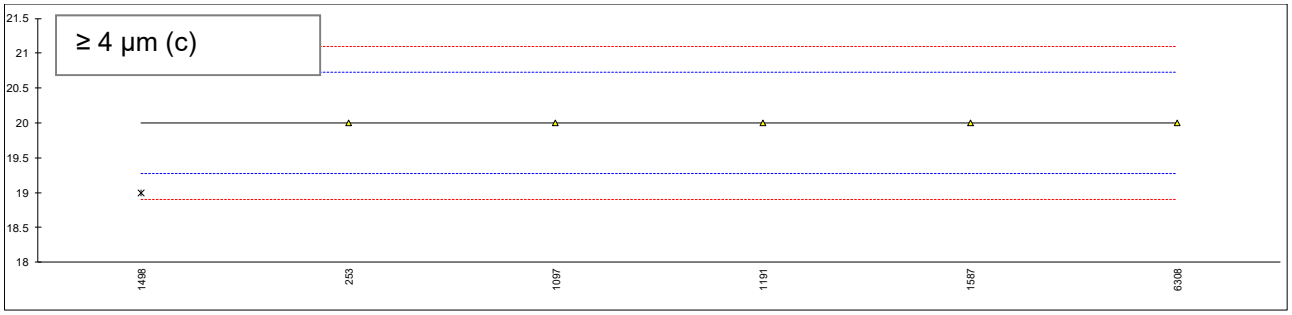

≥ 25 µm (c)
10
9
8
7
6
5
4
3
2
1
0
1498
1097
253
1191
6308
1587

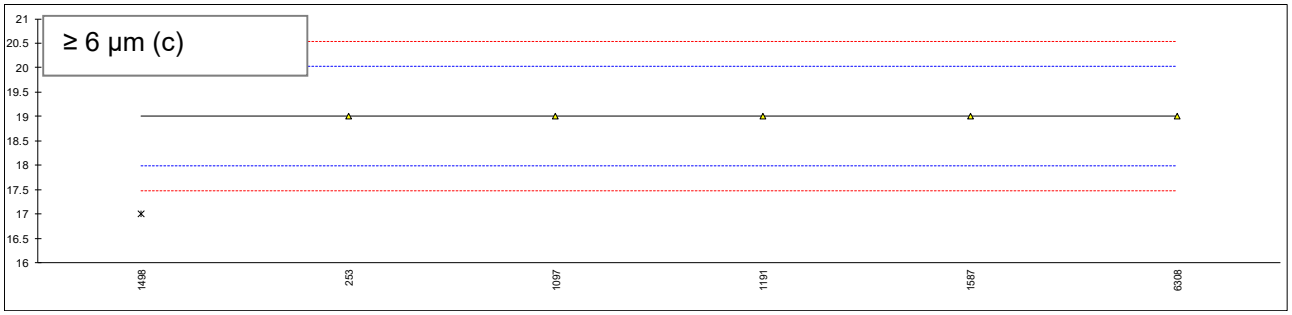

≥ 30 µm (c)
3
2.5
2
1.5
1
0.5
0
1498
1097
1191
253
6308
1587

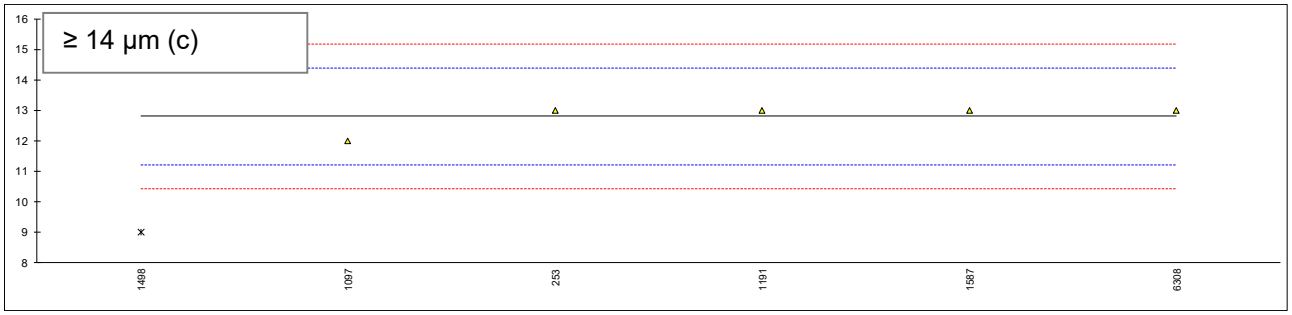
Determination of Particle Size Distribution by IP564 on sample #20021, results in ISO scale numbers

lab	method	≥4 µm (c)	mark	z(targ)	≥6 µm (c)	mark	z(targ)	≥14 µm (c)	mark	z(targ)
140		-----		-----	-----		-----	-----		-----
150		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
225		-----		-----	-----		-----	-----		-----
237		-----		-----	-----		-----	-----		-----
253	ISO4406 acc. to IP564	20		0.00	19		0.00	13		0.25
323		-----		-----	-----		-----	-----		-----
333		-----		-----	-----		-----	-----		-----
334		-----		-----	-----		-----	-----		-----
335		-----		-----	-----		-----	-----		-----
360		-----		-----	-----		-----	-----		-----
447		-----		-----	-----		-----	-----		-----
781		-----		-----	-----		-----	-----		-----
825		-----		-----	-----		-----	-----		-----
840		-----		-----	-----		-----	-----		-----
922		-----		-----	-----		-----	-----		-----
963		-----		-----	-----		-----	-----		-----
970		-----		-----	-----		-----	-----		-----
974		-----		-----	-----		-----	-----		-----
1039		-----		-----	-----		-----	-----		-----
1059		-----		-----	-----		-----	-----		-----
1062		-----		-----	-----		-----	-----		-----
1064		-----		-----	-----		-----	-----		-----
1097	ISO4406 acc. to IP564	20		0.00	19		0.00	12		-1.01
1108		-----		-----	-----		-----	-----		-----
1109		-----		-----	-----		-----	-----		-----
1191	ISO4406 acc. to IP564	20		0.00	19		0.00	13		0.25
1212		-----		-----	-----		-----	-----		-----
1299		-----		-----	-----		-----	-----		-----
1397		-----		-----	-----		-----	-----		-----
1498	ISO4406	19	ex	-2.74	17	ex	-3.92	9	ex	-4.79
1564		-----		-----	-----		-----	-----		-----
1585		-----		-----	-----		-----	-----		-----
1587	ISO4406 acc. to IP564	20		0.00	19		0.00	13		0.25
1610		-----		-----	-----		-----	-----		-----
1631		-----		-----	-----		-----	-----		-----
1634		-----		-----	-----		-----	-----		-----
1724		-----		-----	-----		-----	-----		-----
6075		-----		-----	-----		-----	-----		-----
6201		-----		-----	-----		-----	-----		-----
6203		-----		-----	-----		-----	-----		-----
6238		-----		-----	-----		-----	-----		-----
6262		-----		-----	-----		-----	-----		-----
6308	ISO4406 acc. to IP564	20		0.00	19		0.00	13		0.25
	normality	unknown			unknown			unknown		
	n	5			5			5		
	outliers	0+(1ex)			0+(1ex)			0+(1ex)		
	mean (n)	20.00			19.00			12.80		
	st.dev. (n)	0.000			0.000			0.447		
	R(calc.)	0.00			0.00			1.25		
	st.dev.(IP564:13)	0.365			0.510			0.794		
	R(IP564:13)	1.02			1.43			2.22		

Lab 1498 test results excluded because of outliers in counts/mL


≥ 4 µm (c)
21.5
21
20.5
20
19.5
19
18.5
18
1498
253
1097
1191
1587
6308


≥ 6 µm (c)
21
20.5
20
19.5
19
18.5
18
17.5
17
16.5
16
1498
253
1097
1191
1587
6308

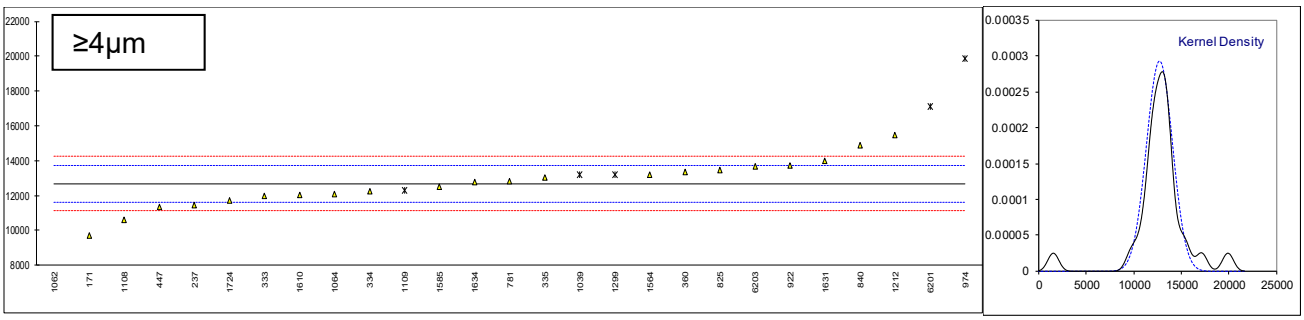

≥ 14 µm (c)
16
15
14
13
12
11
10
9
8
1498
1097
253
1191
1587
6308

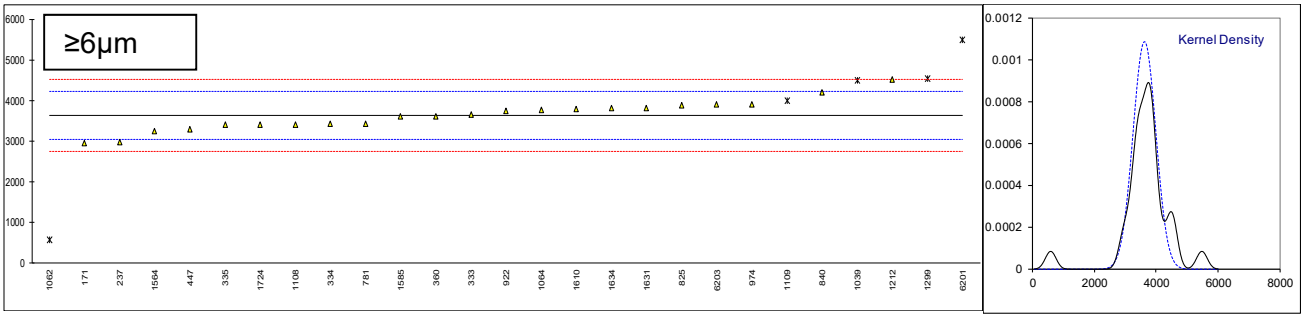
Determination of Particle Size Distribution on sample #20021 acc. to IP565, results in counts/mL

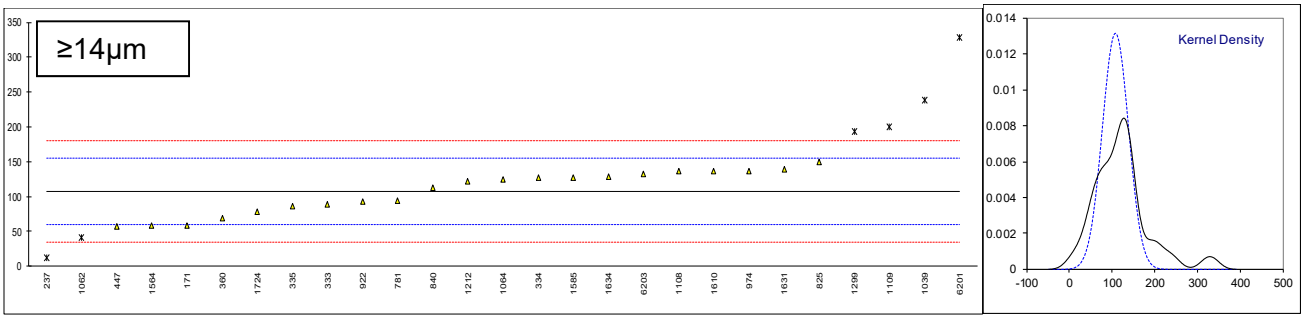
lab	method	≥4 µm (c)	m	≥6 µm(c)	m	≥14 µm (c)	m	≥21 µm (c)	m	≥25 µm (c)	m	≥30 µm (c)	m
140		-----		-----		-----		-----		-----		-----	
150		-----		-----		-----		-----		-----		-----	
171	IP565	9694		2953		59		5		1		0	
225		-----		-----		-----		-----		-----		-----	
237	D7647	11424.5		2978.8		12.1	R1	0.5		0.1		0	
253		-----		-----		-----		-----		-----		-----	
323		-----		-----		-----		-----		-----		-----	
333	IP565	11969		3651		89		8		2		1	
334	IP565	12218		3436		126.8		24.2		7.5		2.5	
335	IP565	13047.6		3401.1		86.4		7.8		1.8		0.4	
360	IP565	13367.2		3604.1		69.1		4.3		1.2		0.4	
447	IP565	11356.0		3292.5		56.5		1.8		0.5		0.2	
781	IP565	12832.8		3436.9		94.2		14.4		4.7		1.5	
825	IP565	13472		3870		150		33		15	R5	5	
840	IP565	14905.6		4206.2		112.4		9.3		2.2		0.3	
922	IP565	13745.3		3735.5		93.3		14.0		5.1		1.2	
963		-----		-----		-----		-----		-----		-----	
970		-----		-----		-----		-----		-----		-----	
974	IP565	19860	C,R1	3902		137		11		5		2	
1039	IP565	13201	ex	4489	ex	238	ex	60	R5	28	R1	14	R1
1059		-----		-----		-----		-----		-----		-----	
1062	IP565	1504	R1	578	R1	41.7	ex	1.8	ex	0.6	ex	0.2	ex
1064	IP565	12109.30		3768.20		124.40		6.50		1.10		0.20	
1097		-----		-----		-----		-----		-----		-----	
1108	IP565	10589		3402		136		24.5		9.1		3.1	
1109	IP565	12300.0	ex	3986.6	ex	199.6	ex	53.0	R5	25.8	R1	12.8	R1
1191		-----		-----		-----		-----		-----		-----	
1212	IP565	15480.8		4525.6		121.5		3.8		1.1		0.3	
1299	IP577	13209.4	ex	4535.0	ex	193.1	ex	50.0	R5	28.3	R1	9.6	R1
1397		-----		-----		-----		-----		-----		-----	
1498		-----		-----		-----		-----		-----		-----	
1564	IP565	13217.3		3240.2		58.5		0.6		0.2		0.1	
1585	IP565	12516.3		3603.6		127.8		19.7		8.3		4.7	
1587		-----		-----		-----		-----		-----		-----	
1610	IP565	12051.2		3791.6		136.3		17.7		6.2		1.7	
1631	IP565	13981.3		3820.1		138.5		24.8		8.7		2.3	
1634	IP565	12764		3818		128		20		7		1	
1724	IP565	11695.7		3401.8		77.8		10.5		3.7		1.4	
6075		-----		-----		-----		-----		-----		-----	
6201	IP565	17094.4	R1	5488.6	R5	328.8	R1	50.0	R5	23.0	R1	13.4	R1
6203	IP565	13653.15		3897		132.3		10.6		2.5		0.65	
6238		-----		-----		-----		-----		-----		-----	
6262		-----		-----		-----		-----				-----	
6308		-----		-----		-----		-----				-----	
normality		OK		OK		OK		OK		OK		not OK	
n		21		22		21		22		21		22	
outliers		3+(3ex)		2+(3ex)		4+(2ex)		4+(1ex)		5+(1ex)		4+(1ex)	
mean (n)		12671		3624		107.4		12.36		3.76		1.36	
st.dev. (n)		1363.4		368.1		30.40		8.973		3.035		1.431	
R(calc.)		3818		1031		85.1		25.12		8.50		4.01	
st.dev.(IP565:13)		521.8		293.6		24.04		4.510		1.872		0.850	
R(IP565:13)		1461		822		67.3		12.63		5.24		2.38	

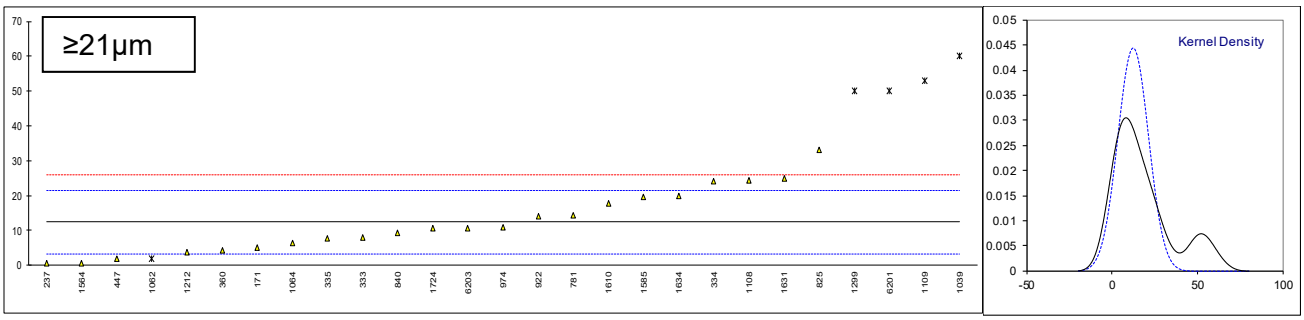
Lab 974 first reported 16620
Lab 1039, 1062, 1109 and 1299 test results excluded, there were three or more outliers in both counts/ml and ISO scale numbers

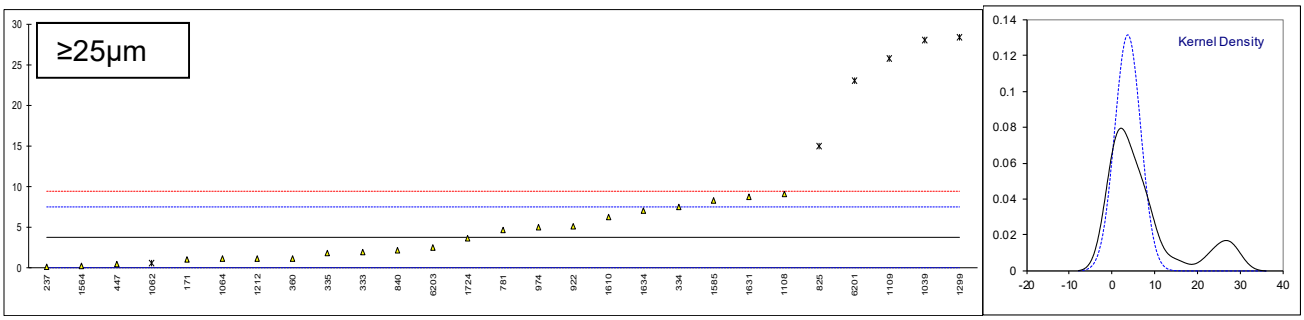
R1 and R5: respectively R(0.01) and R(0.05)

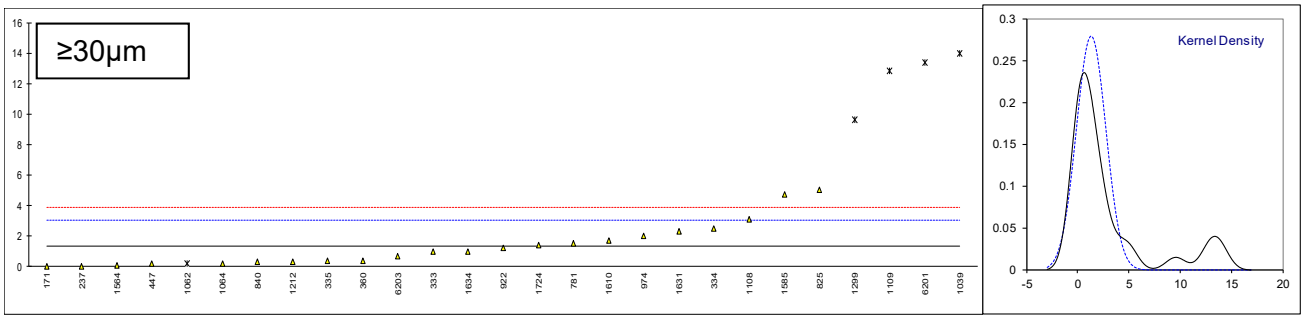

≥4µm
Kernel Density


≥6µm
Kernel Density


≥14µm
Kernel Density


≥21µm
Kernel Density

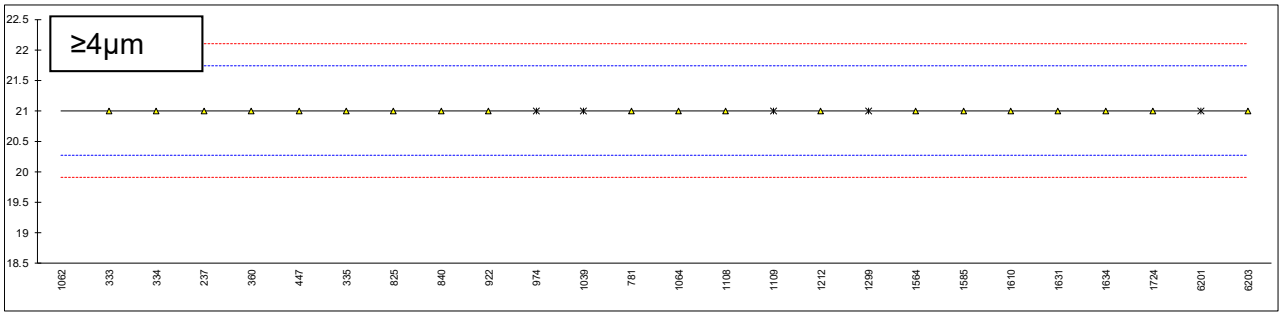

≥25µm
Kernel Density

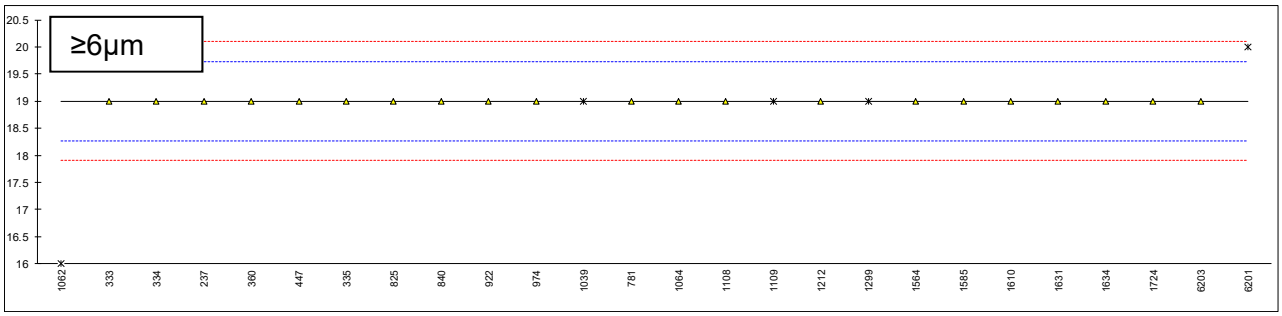

≥30µm
Kernel Density

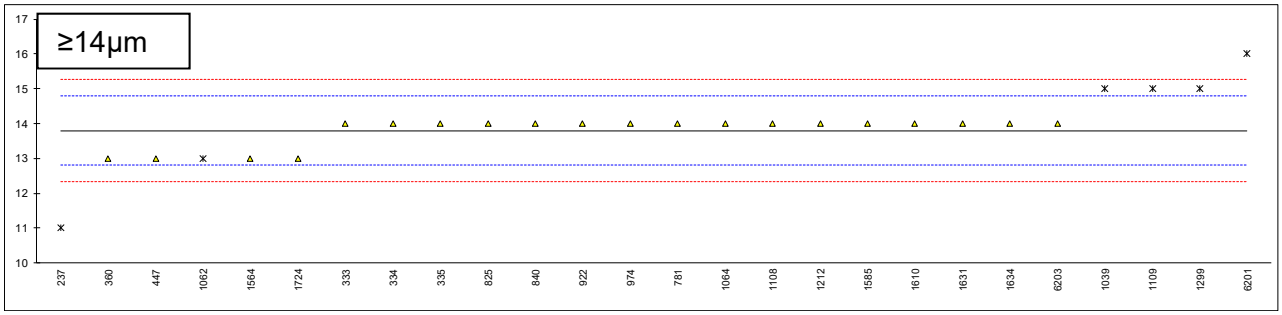
Determination of Particle Size Distribution by IP565 on sample #20021, results in ISO scale numbers

lab	method	≥4µm(c)	mark	z(targ)	≥6µm(c)	mark	z(targ)	≥14 µm (c)	mark	z(targ)
140		-----		-----	-----		-----	-----		-----
150		-----		-----	-----		-----	-----		-----
171		-----		-----	-----		-----	-----		-----
225		-----		-----	-----		-----	-----		-----
237	ISO4406	21		0.00	19		0.00	11	R(0.01)	-5.71
253		-----		-----	-----		-----	-----		-----
323		-----		-----	-----		-----	-----		-----
333	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
334	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
335	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
360		21		0.00	19		0.00	13		-1.63
447	ISO4406 acc. to IP565	21		0.00	19		0.00	13		-1.63
781	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
825	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
840	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
922	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
963		-----		-----	-----		-----	-----		-----
970		-----		-----	-----		-----	-----		-----
974	ISO4406 acc. to IP565	21	ex	0.00	19		0.00	14		0.41
1039	ISO4406 acc. to IP565	21	ex	0.00	19	ex	0.00	15	ex	2.45
1059		-----		-----	-----		-----	-----		-----
1062	ISO4406 acc. to IP565	18	R(0.01)	-8.20	16	R(0.01)	-8.20	13	ex	-1.63
1064	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1097		-----		-----	-----		-----	-----		-----
1108	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1109	ISO4406	21	ex	0.00	19	ex	0.00	15	ex	2.45
1191		-----		-----	-----		-----	-----		-----
1212	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1299	ISO4406 acc. to IP577	21	ex	0.00	19	ex	0.00	15	ex	2.45
1397		-----		-----	-----		-----	-----		-----
1498		-----		-----	-----		-----	-----		-----
1564	ISO4406 acc. to IP565	21		0.00	19		0.00	13		-1.63
1585	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1587		-----		-----	-----		-----	-----		-----
1610	ISO4406	21		0.00	19		0.00	14		0.41
1631	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1634	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
1724	ISO4406 acc. to IP565	21		0.00	19		0.00	13		-1.63
6075		-----		-----	-----		-----	-----		-----
6201	ISO4406 acc. to IP565	21	ex	0.00	20	ex	2.73	16	R(0.05)	4.49
6203	ISO4406 acc. to IP565	21		0.00	19		0.00	14		0.41
6238		-----		-----	-----		-----	-----		-----
6262		-----		-----	-----		-----	-----		-----
6308		-----		-----	-----		-----	-----		-----
	normality	unknown			unknown			OK		
	n	20			21			20		
	outliers	1+(5ex)			1+(4ex)			2+(4ex)		
	mean (n)	21.00			19.00			13.80		
	st.dev. (n)	0.000			0.000			0.410		
	R(calc.)	0.00			0.00			1.15		
	st.dev.(IP565:13)	0.366			0.366			0.490		
	R(IP565:13)	1.03			1.03			1.37		

Lab 974 test result excluded for corresponding outlier in counts/mL
Lab 1039, 1062, 1109,1299 and 6201 test results are excluded, there were three or more outliers in both counts/ml and ISO scale numbers


≥4µm
22.5
22
21.5
21
20.5
20
19.5
19
18.5
1062 333 334 237 360 447 335 825 840 922 974 1039 781 1064 1108 1109 1212 1299 1564 1585 1610 1631 1634 1724 6201 6203


≥6µm
20.5
20
19.5
19
18.5
18
17.5
17
16.5
16
1062 333 334 237 360 447 335 825 840 922 974 1039 781 1064 1108 1109 1212 1299 1564 1585 1610 1631 1634 1724 6203 6201


≥14µm
17
16
15
14
13
12
11
10
237 360 447 1062 1564 1724 333 334 335 825 840 922 974 781 1064 1108 1212 1585 1610 1631 1634 6203 1039 1109 1299 6201

APPENDIX 2 The z-scores of Particle Size Distribution determination

z-scores on sample #20021 acc. to IP564, in (cumulative) counts/ml

Lab	≥4 µm	≥6 µm	≥14 µm	≥21 µm	≥25 µm	≥30 µm
140	-----	-----	-----	-----	-----	-----
150	-----	-----	-----	-----	-----	-----
171	-----	-----	-----	-----	-----	-----
225	-----	-----	-----	-----	-----	-----
237	-----	-----	-----	-----	-----	-----
253	0.14	-0.82	0.69	-0.26	-0.36	-0.20
323	-----	-----	-----	-----	-----	-----
333	-----	-----	-----	-----	-----	-----
334	-----	-----	-----	-----	-----	-----
335	-----	-----	-----	-----	-----	-----
360	-----	-----	-----	-----	-----	-----
447	-----	-----	-----	-----	-----	-----
781	-----	-----	-----	-----	-----	-----
825	-----	-----	-----	-----	-----	-----
840	-----	-----	-----	-----	-----	-----
922	-----	-----	-----	-----	-----	-----
963	-----	-----	-----	-----	-----	-----
970	-----	-----	-----	-----	-----	-----
974	-----	-----	-----	-----	-----	-----
1039	-----	-----	-----	-----	-----	-----
1059	-----	-----	-----	-----	-----	-----
1062	-----	-----	-----	-----	-----	-----
1064	-----	-----	-----	-----	-----	-----
1097	0.11	0.94	-1.49	-1.20	-1.17	-0.86
1108	-----	-----	-----	-----	-----	-----
1109	-----	-----	-----	-----	-----	-----
1191	-0.55	-0.31	-0.54	-0.06	-0.25	-0.53
1212	-----	-----	-----	-----	-----	-----
1299	-----	-----	-----	-----	-----	-----
1397	-----	-----	-----	-----	-----	-----
1498	-9.59	-5.96	-4.05	-2.11	-2.04	-1.53
1564	-----	-----	-----	-----	-----	-----
1585	-----	-----	-----	-----	-----	-----
1587	-0.07	-0.07	0.39	1.14	1.65	1.79
1610	-----	-----	-----	-----	-----	-----
1631	-----	-----	-----	-----	-----	-----
1634	-----	-----	-----	-----	-----	-----
1724	-----	-----	-----	-----	-----	-----
6075	-----	-----	-----	-----	-----	-----
6201	-----	-----	-----	-----	-----	-----
6203	-----	-----	-----	-----	-----	-----
6238	-----	-----	-----	-----	-----	-----
6262	-----	-----	-----	-----	-----	-----
6308	0.38	0.26	0.94	0.38	0.13	-0.20

z-scores on sample #20021 acc. to IP565, in (cumulative) counts/ml

Lab	≥4 µm	≥6 µm	≥14 µm	≥21 µm	≥25 µm	≥30 µm
140	-----	-----	-----	-----	-----	-----
150	-----	-----	-----	-----	-----	-----
171	-5.71	-2.29	-2.01	-1.63	-1.48	-1.60
225	-----	-----	-----	-----	-----	-----
237	-2.39	-2.20	-3.96	-2.63	-1.96	-1.60
253	-----	-----	-----	-----	-----	-----
323	-----	-----	-----	-----	-----	-----
333	-1.35	0.09	-0.76	-0.97	-0.94	-0.43
334	-0.87	-0.64	0.81	2.62	2.00	1.34
335	0.72	-0.76	-0.87	-1.01	-1.05	-1.13
360	1.33	-0.07	-1.59	-1.79	-1.37	-1.13
447	-2.52	-1.13	-2.12	-2.34	-1.74	-1.37
781	0.31	-0.64	-0.55	0.45	0.50	0.16
825	1.54	0.84	1.77	4.58	6.00	4.28
840	4.28	1.98	0.21	-0.68	-0.83	-1.25
922	2.06	0.38	-0.59	0.36	0.71	-0.19
963	-----	-----	-----	-----	-----	-----
970	-----	-----	-----	-----	-----	-----
974	13.78	0.95	1.23	-0.30	0.66	0.75
1039	1.02	2.95	5.43	10.56	12.95	14.88
1059	-----	-----	-----	-----	-----	-----
1062	-21.40	-10.38	-2.73	-2.34	-1.69	-1.37
1064	-1.08	0.49	0.71	-1.30	-1.42	-1.37
1097	-----	-----	-----	-----	-----	-----
1108	-3.99	-0.76	1.19	2.69	2.85	2.05
1109	-0.71	1.23	3.84	9.01	11.77	13.46
1191	-----	-----	-----	-----	-----	-----
1212	5.38	3.07	0.59	-1.90	-1.42	-1.25
1299	1.03	3.10	3.57	8.35	13.11	9.70
1397	-----	-----	-----	-----	-----	-----
1498	-----	-----	-----	-----	-----	-----
1564	1.05	-1.31	-2.03	-2.61	-1.90	-1.48
1585	-0.30	-0.07	0.85	1.63	2.42	3.93
1587	-----	-----	-----	-----	-----	-----
1610	-1.19	0.57	1.20	1.18	1.30	0.40
1631	2.51	0.67	1.30	2.76	2.64	1.10
1634	0.18	0.66	0.86	1.69	1.73	-0.43
1724	-1.87	-0.76	-1.23	-0.41	-0.03	0.05
6075	-----	-----	-----	-----	-----	-----
6201	8.48	6.35	9.21	8.35	10.28	14.17
6203	1.88	0.93	1.04	-0.39	-0.67	-0.84
6238	-----	-----	-----	-----	-----	-----
6262	-----	-----	-----	-----	-----	-----
6308	-----	-----	-----	-----	-----	-----

APPENDIX 3

Equipment used in Particle Size distribution

lab	Equipment	Test Method based on equipment	Test Method reported	Calibration method reported	Remark
140					
150	Stanhope-Seta	IP565	IP565		
171	Stanhope-Seta	IP565	IP565		
225					
237	Stanhope-Seta	D7647	D7647	ISO11171	
253	Parker Hannifin	IP564	IP564		
323					
333	Stanhope-Seta	IP565	IP565	ISO11171	
334	Stanhope-Seta	IP565	IP565	ISO11171	
335	Stanhope-Seta	IP565	IP565	ISO11171	
360	Stanhope-Seta	IP565	IP565	ISO11171	
447	Stanhope-Seta	IP565	IP565	ISO11171	
781	Stanhope-Seta	IP565	IP565	ISO11171	
825	Stanhope-Seta	IP565	IP565	ISO11171	
840	Stanhope-Seta	IP565	IP565	ISO11171	
922	Stanhope-Seta	IP565	IP565	ISO11171	
963					
970					
974	Stanhope-Seta	IP565	IP565	ISO11171	
1039	Stanhope-Seta	IP565	IP565	ISO11171	
1059					
1062	Stanhope-Seta	IP565	IP565	ISO11171	
1064	Stanhope-Seta	IP565	IP565	ISO11171	
1097	Parker Hannifin	IP564	IP564	ISO11171	
1108	Stanhope-Seta	IP565	IP565	ISO11171	
1109	Stanhope-Seta	IP565	IP565	ISO11171	
1191	Parker Hannifin	IP564	IP564	ISO11171	
1212	Stanhope-Seta	IP565	IP565	ISO11171	
1299	Pamas	IP577	IP577	ISO11171	
1397					
1498	Parker Hannifin	IP564		ISO11171	
1564	Stanhope-Seta	IP565	IP565	ISO11171	
1585	Stanhope-Seta	IP565	IP565	ISO11171	
1587	Parker Hannifin	IP564	IP564	ISO11171	
1610	Stanhope-Seta	IP565	IP565	ISO11171	
1631	Stanhope-Seta	IP565	IP565	ISO11171	
1634	Stanhope-Seta	IP565	IP565	ISO11171	
1724	Stanhope-Seta	IP565	IP565	ISO11171	
6075					
6201	Stanhope-Seta	IP565	IP565	ISO11171	
6203	Stanhope-Seta	IP565	IP565	ISO11171	
6238					
6262					
6308	Parker Hannifin	IP564	IP564	ISO11171	

APPENDIX 4

Number of participants per country

1 lab in AFGHANISTAN	5 labs in NETHERLANDS
1 lab in AUSTRALIA	2 labs in NIGERIA
4 labs in BELGIUM	1 lab in OMAN
3 labs in BULGARIA	1 lab in PAKISTAN
1 lab in CHILE	2 labs in PHILIPPINES
1 lab in CONGO Brazzaville	1 lab in POLAND
1 lab in COTE D'IVOIRE	1 lab in PORTUGAL
1 lab in CROATIA	1 lab in QATAR
1 lab in CZECH REPUBLIC	1 lab in ROMANIA
1 lab in DENMARK	6 labs in RUSSIAN FEDERATION
1 lab in DJIBOUTI	2 labs in SAUDI ARABIA
3 labs in EGYPT	1 lab in SLOVENIA
1 lab in FINLAND	1 lab in SOMALIA
6 labs in FRANCE	2 labs in SOUTH AFRICA
1 lab in FRENCH GUIANA	1 lab in SOUTH KOREA
1 lab in GERMANY	2 labs in SPAIN
5 labs in GREECE	1 lab in SUDAN
1 lab in GUAM	2 labs in SWEDEN
1 lab in INDIA	1 lab in TANZANIA
2 labs in IRELAND	1 lab in THAILAND
4 labs in ITALY	1 lab in TOGO
1 lab in LEBANON	2 labs in TURKEY
1 lab in LITHUANIA	1 lab in UNITED ARAB EMIRATES
1 lab in MALAYSIA	5 labs in UNITED KINGDOM
1 lab in MALTA	9 labs in UNITED STATES OF AMERICA
1 lab in MARTINIQUE	1 lab in VIETNAM

APPENDIX 5

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), G(1)	= outlier in Grubbs' outlier test
G(0.05), G(5)	= straggler in Grubbs' outlier test
DG(0.01), DG(1)	= outlier in Double Grubbs' outlier test
DG(0.05), DG(5)	= straggler in Double Grubbs' outlier test
R(0.01), R(1)	= outlier in Rosner's outlier test
R(0.05), R(5)	= straggler in Rosner's outlier test
E	= possibly an error in calculations
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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