

Results of Proficiency Test
Base Oil
May 2017

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2013, the Institute for Interlaboratory Studies (iis) organizes a proficiency test for Base Oil. During the annual proficiency testing program 2016/2017, it was decided to continue the round robin for the analysis of Base Oil. In this interlaboratory study 56 laboratories in 34 different countries registered for participation. See appendix 2 for the number of participants per country. In this report, the results of the 2017 Base Oil proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, The Netherlands, was the organizer of this proficiency test (PT). Sample analyses for fit-for-use and homogeneity were subcontracted to an ISO/IEC 17025 accredited laboratory. It was decided to send one bottle of 1L (labelled #17075) of Base Oil that was purchased from a local supplier.

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/IEC 17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.

2.2 PROTOCOL

The protocol followed in the organisation of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of March 2017 (iis-protocol, version 3.4). This protocol is electronically available through the iis website www.iisnl.com, from the FAQ page.

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

The necessary bulk material was obtained from a local supplier. The 200 litre bulk material (Base Oil 22R, group II) was homogenized and part of this bulk was transferred into 78 brown glass bottles of 1 litre (labelled #17075). The homogeneity of the subsamples #17075 was checked by determination of Density at 15°C in accordance with ASTM D4052 on 8 stratified randomly selected samples.

	Density at 15°C in kg/L
Sample #17075-1	0.86060
Sample #17075-2	0.86060
Sample #17075-3	0.86060
Sample #17075-4	0.86060
Sample #17075-5	0.86061
Sample #17075-6	0.86060
Sample #17075-7	0.86061
Sample #17075-8	0.86061

Table 1: homogeneity test results of subsamples #17075

From the above test results, the repeatability was calculated and compared with 0.3 times the corresponding reproducibility of the target test method, in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density at 15°C in kg/L
r (observed)	0.00001
reference test method	ASTM D4052:16
0.3 x R (ref. test method)	0.00015

Table 2: evaluation of the repeatability of the subsamples #17075

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

To each of the participating laboratories, one sample of 1 L in a brown glass bottle (labelled #17075) was sent on April 26, 2017. A SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

The stability of Base Oil packed in amber glass bottle was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSES

The participants were requested to determine on sample #17075: Acid Number (Total), Air-release time at 50°C, Color ASTM, Conradson Carbon Residue, Ramsbottom Carbon Residue, Density at 15°C, Evaporation loss by Noack test, Flash Point COC, Kinematic Viscosity at 40°C and at 100°C, Viscosity Index, Viscosity Stabinger at 40°C and at 100°C, Pour Point (manual and automated), Rust prevention (proc. B), Sulphur, Water and Water Separability at 54°C.

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 calculations.

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

3 RESULTS

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

Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment.

Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalyses). 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 March 2017 (iis-protocol, version 3.4).

For the statistical evaluation the *unrounded* (when available) figures were used instead of the rounded test results. Test results reported as '<...' or '>...' were not used in the statistical evaluation.

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

According to ISO 5725 the original test results per determination were submitted to Dixon's, Grubbs' and/or Rosner's outlier tests. Outliers are marked by D(0.01) for the Dixon's test, by G(0.01) or DG(0.01) for the Grubbs' test and by R(0.01) for the Rosner's test. Stragglers are marked by D(0.05) for the Dixon's test, by G(0.05) or DG(0.05) for the Grubbs' test and by R(0.05) for the Rosner's test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

For each assigned value the uncertainty was determined in accordance with ISO13528. Subsequently the calculated uncertainty was evaluated against the respective requirement based on the target reproducibility in accordance with ISO13528. When the uncertainty passed the evaluation, no remarks are made in the report. However, when the uncertainty failed the evaluation it is mentioned in the report and it will have consequences for the evaluation of the test results.

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

3.2 GRAPHICS

In order to visualise the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported test results are plotted. The corresponding laboratory numbers are on the X-axis.

The straight horizontal line presents the consensus value (a trimmed mean). The four striped lines, parallel to the consensus value line, are the +3s, +2s, -2s and -3s target reproducibility limits of the selected reference test method. Outliers and other data, which were excluded from the calculations, are represented as a cross. Accepted data are represented as a triangle.

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

3.3 Z-SCORES

To evaluate the performance of the participating laboratories the z-scores were calculated. As it was decided to evaluate the performance of the participants in this proficiency test (PT) against the literature requirements, e.g. ASTM reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study. This target standard deviation was calculated from the literature reproducibility by division with 2.8.

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

The z-scores were calculated according to:

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

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

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

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

4 EVALUATION

In this proficiency test, no problems were encountered during the execution. One participant reported the test results after the final reporting date. In total 56 participants reported 547 test results. Observed were 19 outlying results, which is 3.5% of the numerical results. In proficiency studies, outlier percentages of 3% - 7.5% are quite normal.

4.1 EVALUATION PER TEST

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

In the iis PT reports, ASTM methods are referred to with a number (e.g. D189) and an added designation for the year that the method was adopted or revised (e.g. D189:06). If applicable, a designation in parentheses is added to designate the year of reapproval (e.g.

D189:06(2014). In the results tables of Appendix 1 only the method number and year of adoption or revision e.g. D189:06 will be used.

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

Acid Number (Total): This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D974:14e2.

Air-release time: This determination was not problematic. One statistical outlier was observed. However the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D3427:15.

Color: This determination was not problematic. No statistical outliers were observed. The consensus value of the group was L0.5.

Conradson CR: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D189:06(2014).

Ramsbottom CR: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in full agreement with the requirements of ASTM D524:15. One false negative test result was observed.

Density at 15°C: This determination was not problematic. Three statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in full agreement with the requirements of ASTM D4052:16.

Evaporation loss:
by Noack test This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5800:15a-proc B.

Flash Point C.O.C.: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in full agreement with ASTM D92:16b.

- Kin.Visco.at 40°C: 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 D445:17.
- Kin.Visco.at 100°C: This determination was not problematic. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D445:17.
- Viscosity Index: This determination was problematic. One statistical outlier was observed and three other test results were excluded from the statistical evaluation as they were a statistical outlier in the Kinematic viscosity at 40°C and/or 100°C. The calculated reproducibility after rejection of the suspect data is not in agreement with ASTM D2270:10(2016). Also iis calculated the Viscosity Index from the test results reported for the kinematic viscosities at 40°C and 100°C. These calculated test results were compared to the reported test results and separately statistically evaluated. The calculated reproducibility after rejection of the suspect data is in full agreement with ASTM D2270:10(2016). It may be concluded that reporting less rounded results and not making any calculation errors will significantly improve the performance of the group for viscosity index.
- Visco. Stabinger at 40°C: This determination was problematic. No statistical outliers were observed. However, the calculated reproducibility is not in agreement with the requirements of ASTM D7042:16e3.
- Visco. Stabinger at 100°C: This determination was problematic. Two statistical outliers were observed. The calculated reproducibility after rejection of the statistical outliers is not in agreement with the requirements of ASTM D7042:16e3.
- Pour Point: manual This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D97:17.
- Pour Point: automated This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ASTM D5950:14.
- Rust prevention: Regretfully, only five participants reported a test result. Four participants reported the presence of rust (Fail / Severe rusting) and 1 participant reported "Pass".

Sulphur: The consensus value of the group was below the application range (3 mg/kg – 4.6 %M/M) of ASTM D2622:16. Therefore, no significant conclusions were drawn.

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

Water separability: This determination was not problematic. No statistical outliers were observed. All calculated reproducibilities are in agreement with the requirements of ASTM D1401:12e1. ASTM D1401 describes complete break only as '40-40-0', whereas a complete break also was interpreted as 'no emulsion layer present'. Most participants reported the complete break as 40-40-0. One participant reported the complete break as 42-38-0 and another participant reported 41-39-0.

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

A comparison has been made between the reproducibility as declared by the relevant standard and the reproducibility as found for the group of participating laboratories that participated. The average results, calculated reproducibilities and reproducibilities derived from literature standards (in casu ASTM standards), are compared in the next table.

Parameter	Unit	n	Average	2.8 * sd	R(lit)
Acid Number, Total	mg KOH/g	29	0.013	0.029	0.04
Air-release time at 50°C	min	9	1.8	1.0	1.8
Color ASTM		52	L0.5	n.a.	n.a.
Conradson Carbon Residue	%M/M	11	0.008	0.017	0.021
Ramsbottom Carbon Residue	%M/M	8	0.040	0.027	0.026
Density at 15 °C	kg/L	50	0.8607	0.0004	0.0005
Evaporation loss by Noack	%M/M	15	9.1	0.9	1.2
Flash Point C.O.C.	°C	46	236	17	18
Kinematic Viscosity at 40 °C	mm ² /s	50	40.48	0.28	0.55
Kinematic Viscosity at 100 °C	mm ² /s	50	6.435	0.072	0.122
Viscosity Index		46	108.53	2.52	2
Stabinger Viscosity at 40 °C	mm ² /s	15	40.55	0.29	0.24
Stabinger Viscosity at 100 °C	mm ² /s	12	6.452	0.043	0.033
Pour Point manual	°C	36	-12.8	5.2	9
Pour Point automated (Δ 1°C)	°C	18	-13.5	5.9	4.5
Rust Prevention (proc. B)		4	fail	n.a.	n.a.
Sulphur	mg/kg	22	<3	n.a.	n.a.
Water	mg/kg	41	25.7	31.6	118.6
Water Separability at 54°C					
- Time to reach 3 ml or less emulsion	Min	12	2.6	6.0	20
- Time to reach 37 of water	Min	10	2.5	6.0	20
- Time to reach complete break	Min	14	3.5	5.2	20

Table 3: reproducibilities of tests on sample #17075

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

4.3 COMPARISON OF THE PROFICIENCY TEST OF MAY 2017 WITH PREVIOUS PTS

	May 2017	May 2016	May 2015	May 2014
Number of reporting labs	56	50	43	43
Number of results reported	547	542	397	408
Statistical outliers	19	22	11	19
Percentage outliers	3.5%	4.1%	2.8%	4.7%

Table 4: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared to the requirements of the respective standards.

The conclusions are given in the following table:

Determination	May 2017	May 2016	May 2015	May 2014
Acid Number, Total	+	++	+	+/-
Air-release time at 50°C	+	+/-	+	-
Color ASTM	n.e.	+	n.e.	+
Conradson Carbon Residue	+	++	+	++
Ramsbottom Carbon Residue	+/-	+/-	-	--
Density at 15 °C	+/-	+	-	++
Evaporation loss by Noack	+	+	+	--
Flash Point COC	+/-	+	+	+/-
Kinematic Viscosity at 40 °C	++	++	+	--
Kinematic Viscosity at 100 °C	+	++	++	--
Viscosity Index	-	--	-	--
Stabinger Viscosity at 40 °C	-	-	--	--
Stabinger Viscosity at 100 °C	-	-	--	--
Pour Point manual	+	++	++	-
Pour Point automated	-	+	+/-	n.e.
Rust Prevention	n.e.	n.e.	n.e.	n.e.
Sulphur	n.e.	+/-	n.e.	+
Water	++	++	++	++
Water Separability at 54°C	++	++	++	++

Table 5: comparison determinations against the standard

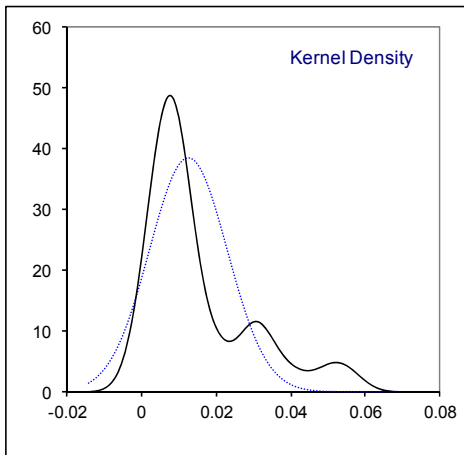
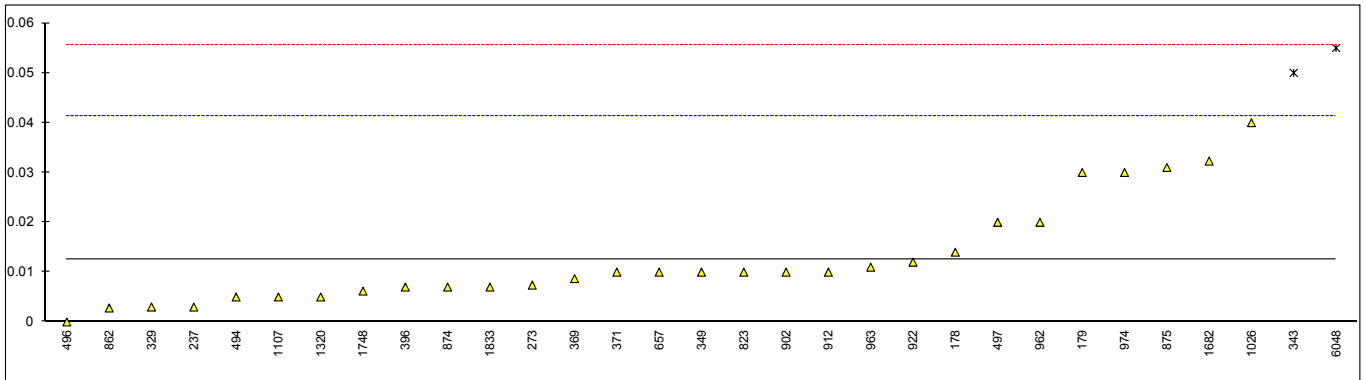
The performance of the determinations against the requirements of the respective standards is listed in the above table. The following performance categories were used:

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

APPENDIX 1

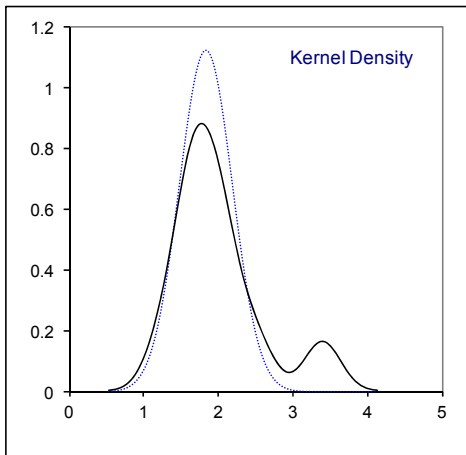
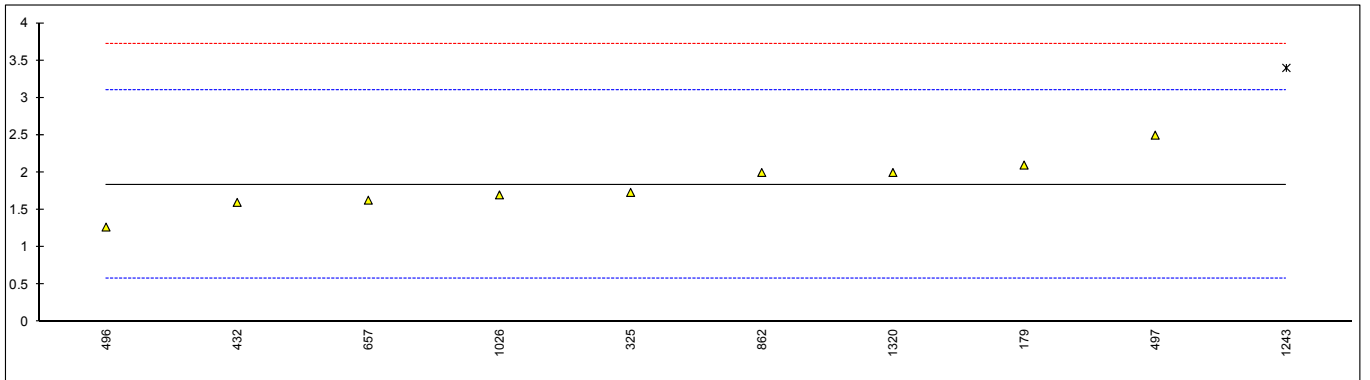
Determination of Acid Number (Total) on sample #17075; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
150	D974	<0.02		----	
171	D974	<0.02		----	
173		----		----	
178	D974	0.014	C	0.09	First reported 0.11
179	D974	0.03		1.21	
237	D974	0.003		-0.68	
273	D974	0.0074		-0.37	
311	D664-A	<0.10		----	
323	D974	< 0.02		----	
325	D664-A	<0.01		----	
329	D974	0.003		-0.68	
333		----		----	
343	D664-A	0.05	R(0.05)	2.61	
349	D664-A	0.01		-0.19	
357	D664-A	< 0,05		----	
369	D974	0.0087		-0.28	
371	D974	0.01		-0.19	
396	D974	0.007		-0.40	
432		----		----	
446	D974	<0.02		----	
485		----		----	
494	D664-A	0.005		-0.54	
496	D974	0.00		-0.89	
497	D664-A	0.02		0.51	
551	D974	<0.02		----	
601		----		----	
603		----		----	
657	D974	0.01		-0.19	
704	D974	<0.02		----	
781	D974	<0.02		----	
823	D664-A	0.01		-0.19	
862	D664-A	0.0028		-0.69	
874	D974	0.007		-0.40	
875	D664-A	0.031		1.28	
886		----		----	
902	D664-A	0.01		-0.19	
912	D974	0.01		-0.19	
922	D664-A	0.012		-0.05	
962	D974	0.02		0.51	
963	D974	0.011		-0.12	
974	D974	0.03		1.21	
982		----		----	
1011	D664-A	< 0,02		----	
1026	D974	0.04		1.91	
1107	D974	0.005		-0.54	
1243	D664-A	< 0,01		----	
1320	D974	0.005		-0.54	
1349		----		----	
1461		----		----	
1682	D664-A	0.0323		1.37	
1728		----		----	
1748	D664-A	0.0062		-0.45	
1833	ISO6618	0.007		-0.40	
1877		----		----	
6048	D974	0.055	R(0.05)	2.96	
6113		----		----	
	normality	suspect			
	n	29			
	outliers	2			
	mean (n)	0.0127			
	st.dev. (n)	0.01040			
	R(calc.)	0.0291			
	R(D974:14e2)	0.04			Compare R(D664:11ae1-A) = 0.14



Determination of Air-release time at 50°C on sample #17075; results in min

lab	method	value	mark	z(targ)	remarks
150		----		----	
171		----		----	
173		----		----	
178		----		----	
179	D3427	2.1		0.42	
237		----		----	
273		----		----	
311		----		----	
323		----		----	
325	D3427	1.73333		-0.16	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432	ISO9120	1.6		-0.38	
446		----		----	
485		----		----	
494		----		----	
496	D3427	1.27		-0.90	
497	ISO9120	2.5		1.05	
551		----		----	
601		----		----	
603		----		----	
657	D3427	1.63		-0.33	
704		----		----	
781		----		----	
823		----		----	
862	D3427	2		0.26	
874		----		----	
875		----		----	
886		----		----	
902		----		----	
912		----		----	
922		----		----	
962		----		----	
963		----		----	
974		----		----	
982		----		----	
1011		----		----	
1026	D3427	1.7		-0.22	
1107		----		----	
1243	ISO9120	3.4	G(0.05)	2.48	
1320	D3427	2.0		0.26	
1349		----		----	
1461		----		----	
1682		----		----	
1728		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
6048		----		----	
6113		----		----	
	normality	OK			
	n	9			
	outliers	1			
	mean (n)	1.837			
	st.dev. (n)	0.3557			
	R(calc.)	0.996			
	R(D3427:15)	1.762			



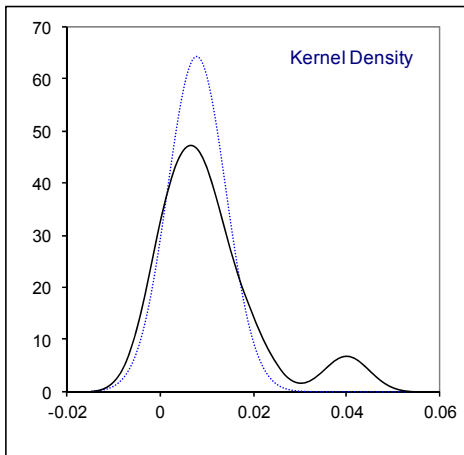
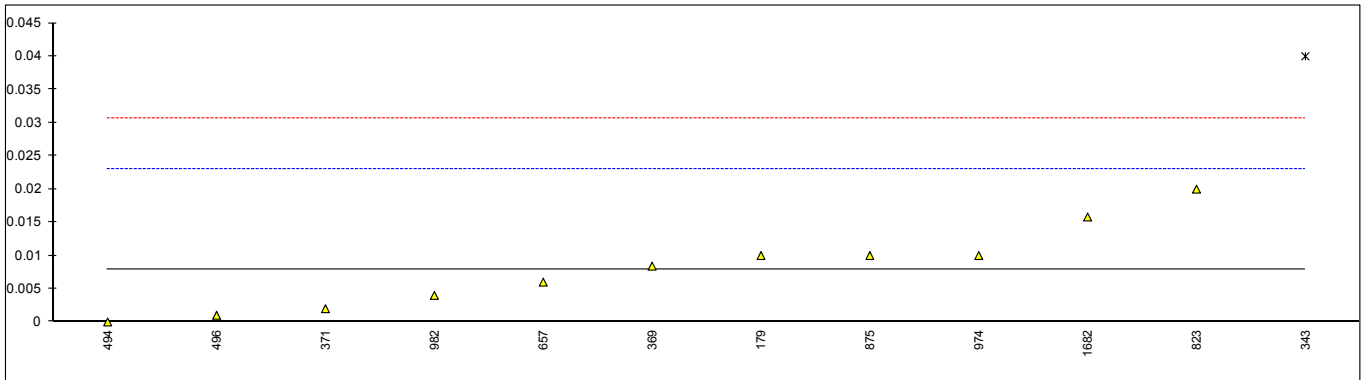
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Determination of Color ASTM on sample #17075

lab	method	value	mark	z(targ)	remarks
150	D6045	L0.5		----	
171	D1500	L0.5		----	
173	D1500	L0.5		----	
178		----		----	
179	D1500	L0.5		----	
237	D1500	L0.5		----	
273	D1500	L0.5		----	
311	D1500	L0.5		----	
323	D1500	< 0.5		----	
325	D6045	L0.5		----	
329	D1500	L0.5		----	
333		----		----	
343	D1500	L0.5		----	
349	D6045	0		----	
357	D1500	< 0,5		----	
369	D1500	L.0.5		----	
371	D6045	L0.5		----	
396	D1500	L 0.5		----	
432	D1500	L0,5		----	
446	D1500	<0.5		----	
485	D1500	L 0.5		----	
494	D1500	L 0,5		----	
496	D1500	L0.5		----	
497	D1500	L0.5		----	
551	D1500	L0.5		----	
601	D1500	L0.5		----	
603	D1500	L0.5		----	
657	D1500	<0.5		----	
704	D1500	L0.5		----	
781	D1500	<0.5		----	
823	D1500	L0.5		----	
862	D1500	L0.5		----	
874	D1500	<0.5		----	
875	D6045	L 0.5		----	
886		----		----	
902	D1500	L0.5		----	
912	D1500	<0.5		----	
922	D1500	L0.5		----	
962	D1500	L0.5		----	
963	D1500	L0.5		----	
974	D1500	<0.5		----	
982	D1500	L 0.5		----	
1011	D1500	L0,5		----	
1026	D1500	L0.5		----	
1107	D1500	L 0.5		----	
1243	ISO2049	0.0		----	
1320	D1500	L0,5		----	
1349	D6045	L0.5		----	
1461	ISO2049	0		----	
1682	D1500	<0,5		----	
1728	D1500	L0,5		----	
1748	D1500	0.0		----	
1833	D1500	<0.5		----	
1877	D6045	L0.5		----	
6048	D1500	<0,5		----	
6113		----		----	
	normality	n.a.			
	n	52			
	outliers	n.a.			
	mean (n)	L0.5			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D1500:12)	n.a.			

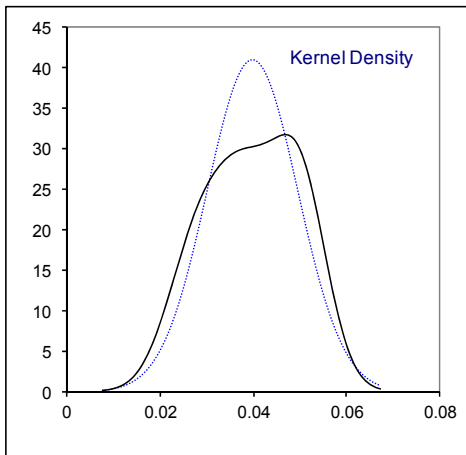
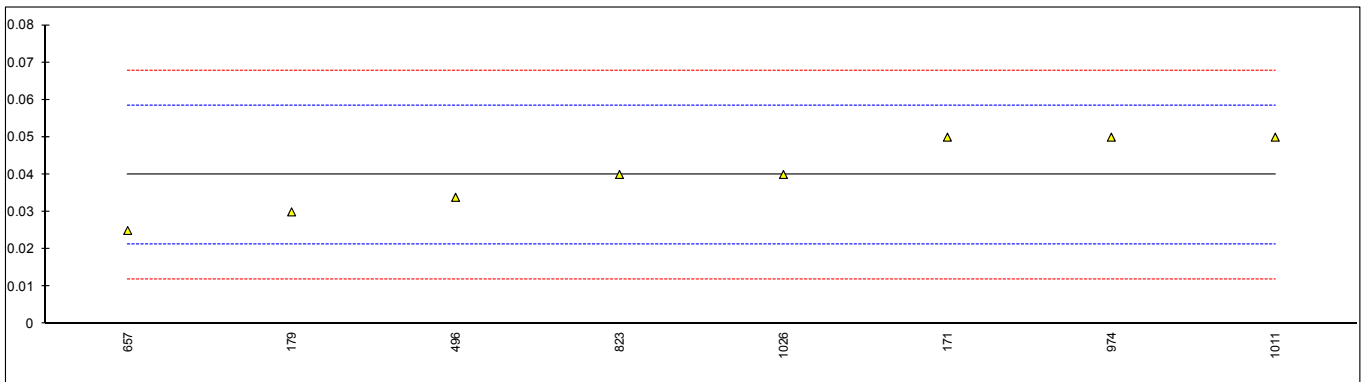
Determination of Conradson Carbon Residue on sample #17075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150	D4530	<0.10		----	
171	D4530	<0.10		----	
173		----		----	
178		----		----	
179	D189	0.01		0.27	
237		----		----	
273	D4530	<0.01		----	
311	D4530	<0.10		----	
323	D4530	< 0.10		----	
325	D4530	<0.01	C	----	First reported 1.95
329		----		----	
333		----		----	
343	D4530	0.04	G(0.01)	4.24	
349	D189	<0.1		----	
357		----		----	
369	D4530	0.0084		0.06	
371	D189	0.002		-0.78	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494	D4530	0.00		-1.05	
496	D4530	0.001		-0.92	
497		----		----	
551	D189	<0.05		----	
601		----		----	
603		----		----	
657	D4530	0.006		-0.25	
704	D4530	<0.10		----	
781	D4530	<0.10		----	
823	D4530	0.02		1.60	
862	D4530	<0.1		----	
874		----		----	
875	D4530	0.01		0.27	
886		----		----	
902	D4530	<0.1		----	
912		----		----	
922	D4530	<0.01		----	
962		----		----	
963		----		----	
974	D189	0.01		0.27	
982	D189	0.004		-0.52	
1011		----		----	
1026		----		----	
1107	D4530	<0.01		----	
1243	DIN51551-1	n.n.		----	
1320	D4530	<0,01		----	
1349		----		----	
1461	ISO6615	absense		----	
1682	D189	0.0158		1.04	
1728		----		----	
1748		----		----	
1833	D4530	<0.1		----	
1877		----		----	
6048	D4530	<0.01		----	
6113		----		----	
	normality	OK			
	n	11			
	outliers	1			
	mean (n)	0.0079			
	st.dev. (n)	0.00621			
	R(calc.)	0.0174			
	R(D189:06)	0.0212			Compare R(D4530) = 0.1408



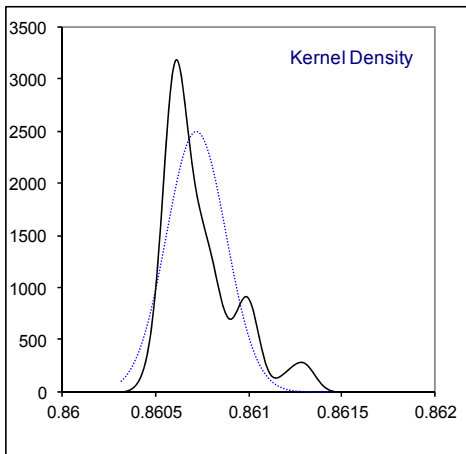
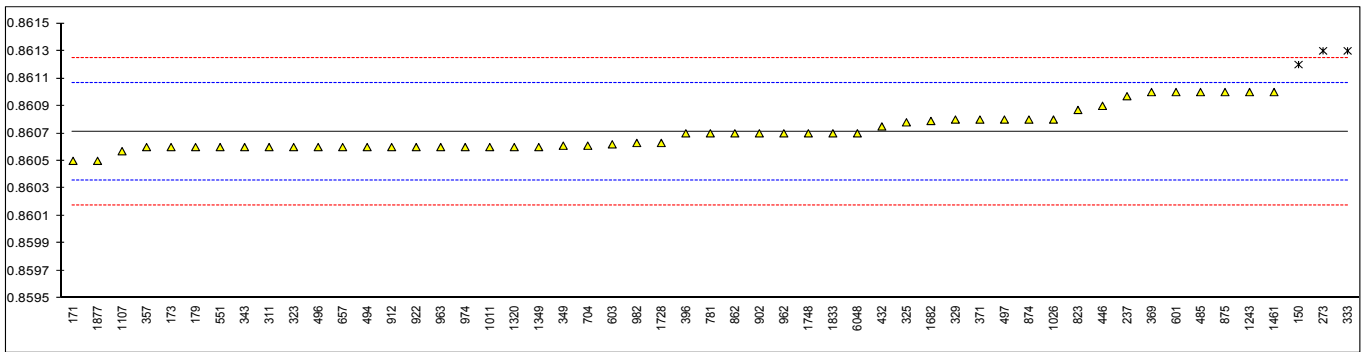
Determination of Ramsbottom Carbon Residue on sample #17075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		----		----	
171	D524	0.05		1.09	
173		----		----	
178		----		----	
179	D524	0.03		-1.06	
237		----		----	
273		----		----	
311		----		----	
323		----		----	
325		----		----	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494		----		----	
496	D524	0.0339		-0.64	
497		----		----	
551	D524	<0.01		<-3.22	Possibly false negative
601		----		----	
603		----		----	
657	D524	0.025		-1.60	
704		----		----	
781		----		----	
823	D524	0.04		0.01	
862		----		----	
874		----		----	
875		----		----	
886		----		----	
902		----		----	
912		----		----	
922		----		----	
962		----		----	
963		----		----	
974	D524	0.05		1.09	
982		----		----	
1011	D524	0.05		1.09	
1026	D524	0.04		0.01	
1107		----		----	
1243		----		----	
1320		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1728		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
6048		----		----	
6113		----		----	
	normality	unknown			
	n	8			
	outliers	0			
	mean (n)	0.0399			
	st.dev. (n)	0.00973			
	R(calc.)	0.0272			
	R(D524:15)	0.0260			



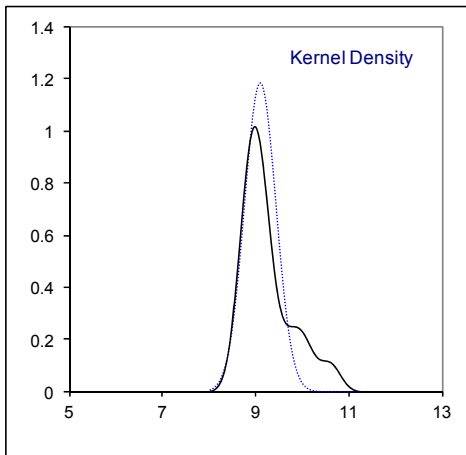
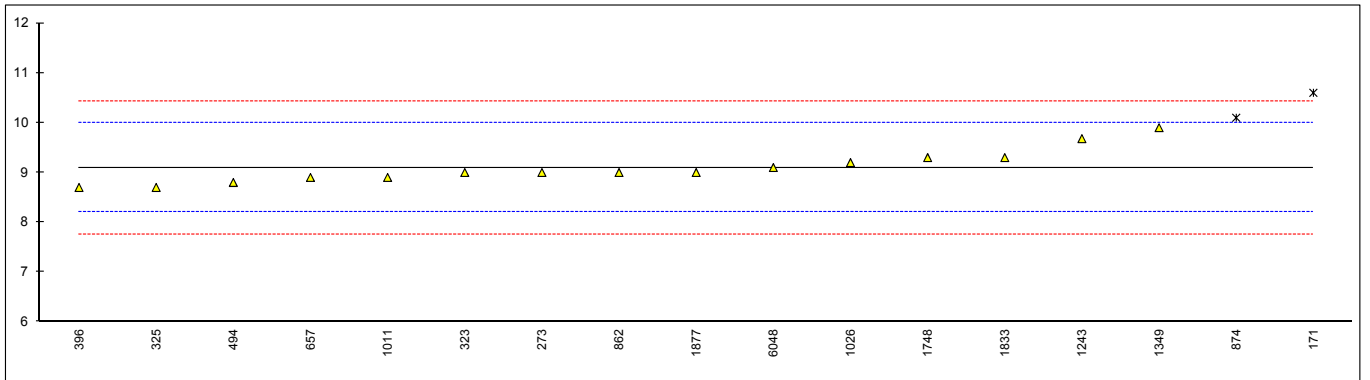
Determination of Density at 15°C on sample #17075; results in kg/L

lab	method	value	mark	z(targ)	remarks
150	D4052	0.8612	R(0.05)	2.74	
171	D4052	0.8605		-1.18	
173	D4052	0.8606		-0.62	
178		-----		-----	
179	D4052	0.8606		-0.62	
237	D4052	0.86097		1.45	
273	D4052	0.8613	R(0.05)	3.30	
311	D4052	0.8606		-0.62	
323	D4052	0.8606		-0.62	
325	D4052	0.86078		0.39	
329	D4052	0.8608		0.50	
333	D4052	0.8613	R(0.05)	3.30	
343	D4052	0.8606		-0.62	
349	D4052	0.86061		-0.56	
357	D4052	0.86060		-0.62	
369	D4052	0.8610		1.62	
371	D4052	0.8608		0.50	
396	D4052	0.8607		-0.06	
432	D4052	0.86075		0.22	
446	D4052	0.8609		1.06	
485	D4052	0.8610		1.62	
494	D4052	0.8606		-0.62	
496	D4052	0.8606		-0.62	
497	D7042	0.8608		0.50	
551	D4052	0.8606		-0.62	
601	D1298	0.8610	C	1.62	First reported 0.8616
603	D4052	0.86062		-0.51	
657	D4052	0.8606		-0.62	
704	D4052	0.86061		-0.56	
781	D4052	0.8607		-0.06	
823	D4052	0.86087		0.89	
862	D4052	0.8607		-0.06	
874	D4052	0.8608		0.50	
875	D4052	0.8610		1.62	
886		-----		-----	
902	D4052	0.8607		-0.06	
912	D4052	0.8606	C	-0.62	First reported 860.63 kg/L
922	D4052	0.8606		-0.62	
962	D4052	0.8607		-0.06	
963	D4052	0.8606		-0.62	
974	D4052	0.8606		-0.62	
982	D4052	0.86063		-0.45	
1011	D4052	0.8606		-0.62	
1026	D4052	0.8608		0.50	
1107	D4052	0.86057		-0.79	
1243	ISO12185	0.8610		1.62	
1320	D4052	0.8606		-0.62	
1349	IP365	0.8606	C	-0.62	Reported 860.6 kg/L
1461	ISO3675	0.8610		1.62	
1682	D4052	0.86079	C	0.44	First reported 0.8580
1728	D4052	0.86063		-0.45	
1748	D4052	0.8607		-0.06	
1833	ISO12185	0.8607		-0.06	
1877	D4052	0.86050		-1.18	
6048	ISO12185	0.8607		-0.06	
6113		-----		-----	
	normality	OK			
	n	50			
	outliers	3			
	mean (n)	0.86071			
	st.dev. (n)	0.000146			
	R(calc.)	0.00041			
	R(D4052:16)	0.0005			



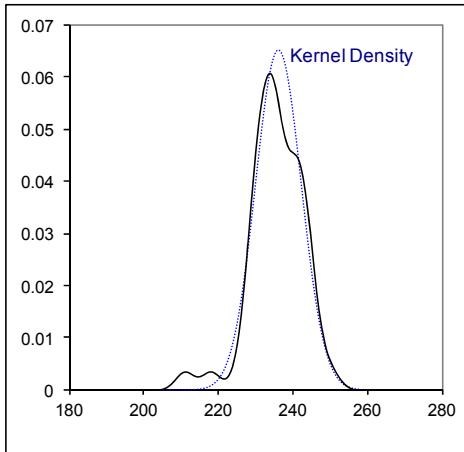
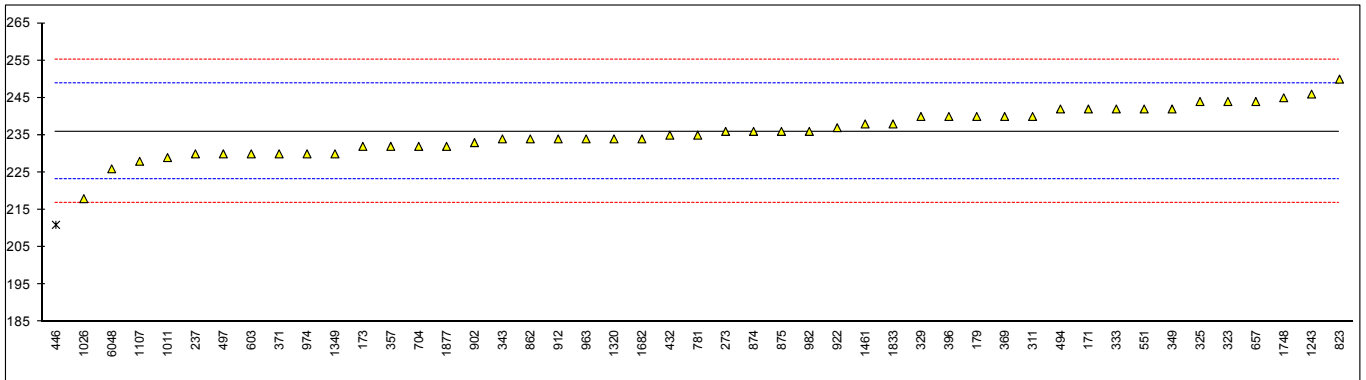
Determination of Evaporation loss by Noack test on sample #17075; results in %M/M

lab	method	value	mark	z(targ)	remarks
150		----		----	
171	D5800 - B	10.6	DG(0.05)	3.37	
173		----		----	
178		----		----	
179		----		----	
237		----		----	
273	D5800 - A	9.0	C	-0.22	First reported 7.6
311		----		----	
323	D5800 - A	9.0		-0.22	
325	CEC L-40-93	8.7		-0.89	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396	D5800 - B	8.7		-0.89	
432		----		----	
446		----		----	
485		----		----	
494	D5800 - B	8.8		-0.67	
496		----		----	
497		----		----	
551		----		----	
601		----		----	
603		----		----	
657	D5800 - B	8.9		-0.45	
704		----		----	
781		----		----	
823		----		----	
862	D5800 - B	9.0		-0.22	
874	D5800 - B	10.1	DG(0.05)	2.25	
875		----		----	
886		----		----	
902		----		----	
912		----		----	
922		----		----	
962		----		----	
963		----		----	
974		----		----	
982		----		----	
1011	CEC L-40-93	8.9		-0.45	
1026	CEC L-40-93	9.2		0.23	
1107		----		----	
1243	DIN51581	9.68		1.31	
1320		----		----	
1349	D5800 - B	9.9		1.80	
1461		----		----	
1682		----		----	
1728		----		----	
1748	D5800 - B	9.3		0.45	
1833	D5800 - A	9.3		0.45	
1877	D5800 - B	9.0		-0.22	
6048	DIN51581	9.1		0.00	
6113		----		----	
	normality	not OK			
	n	15			
	outliers	2			
	mean (n)	9.098			
	st.dev. (n)	0.3377			
	R(calc.)	0.945			
	R(D5800B:15a)	1.247			



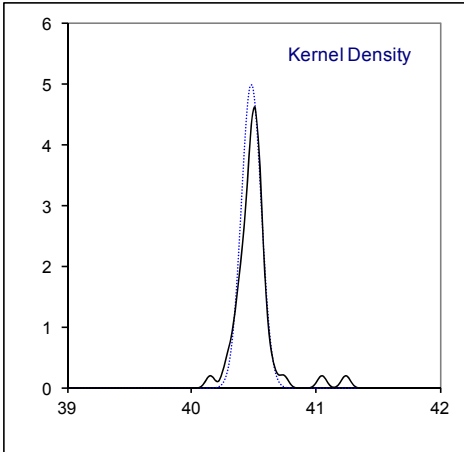
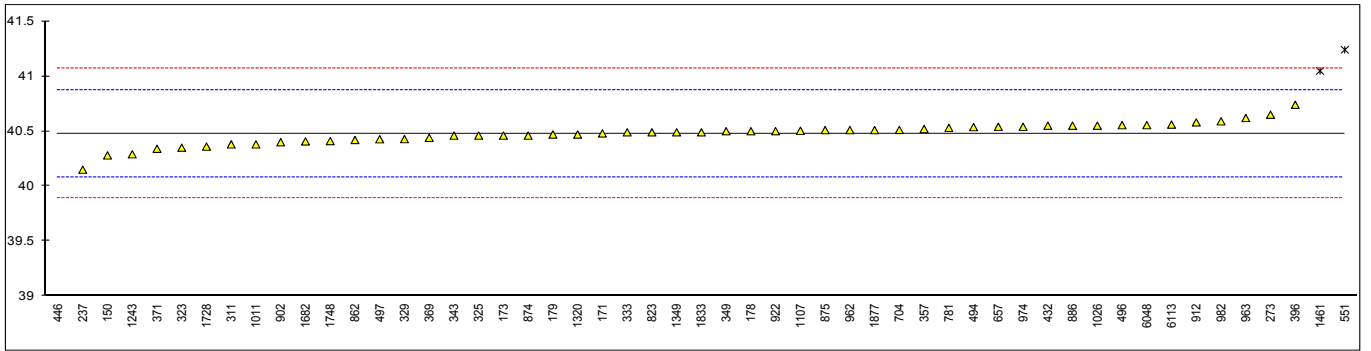
Determination of Flash Point C.O.C. on sample #17075; results in °C

lab	method	value	mark	z(targ)	remarks
150		----		----	
171	D92	242		0.93	
173	D92	232		-0.62	
178		----		----	
179	D92	240		0.62	
237	D92	230.0		-0.93	
273	D92	236		0.00	
311	D92	240.0		0.62	
323	D92	244		1.24	
325	D92	244		1.24	
329	D92	240		0.62	
333	D92	242		0.93	
343	D92	234		-0.31	
349	D92	242		0.93	
357	D92	232.0		-0.62	
369	D92	240		0.62	
371	D92	230		-0.93	
396	D92	240		0.62	
432	D92	235		-0.16	
446	D92	211	R(0.01)	-3.89	
485		----		----	
494	D92	242.0		0.93	
496		----		----	
497	D92	230		-0.93	
551	D92	242		0.93	
601		----		----	
603	D92	230		-0.93	
657	D92	244		1.24	
704	D92	232.0		-0.62	
781	D92	235		-0.16	
823	D92	250		2.18	
862	D92	234		-0.31	
874	D92	236		0.00	
875	D92	236		0.00	
886		----		----	
902	D92	233.0		-0.47	
912	D92	234		-0.31	
922	D92	237		0.16	
962		----		----	
963	D92	234		-0.31	
974	D92	230		-0.93	
982	D92	236.0		0.00	
1011	D92	229		-1.09	
1026	D92	218		-2.80	
1107	D92	228		-1.24	
1243	ISO2592	246		1.56	
1320	D92	234		-0.31	
1349	D92	230		-0.93	
1461	ISO2592	238		0.31	
1682	D92	234		-0.31	
1728		----		----	
1748	D92	245		1.40	
1833	D92	238		0.31	
1877	D92	232		-0.62	
6048	D92	226		-1.56	
6113		----		----	
	normality	OK			
	n	46			
	outliers	1			
	mean (n)	236.00			
	st.dev. (n)	6.128			
	R(calc.)	17.16			
	R(D92:16b)	18			



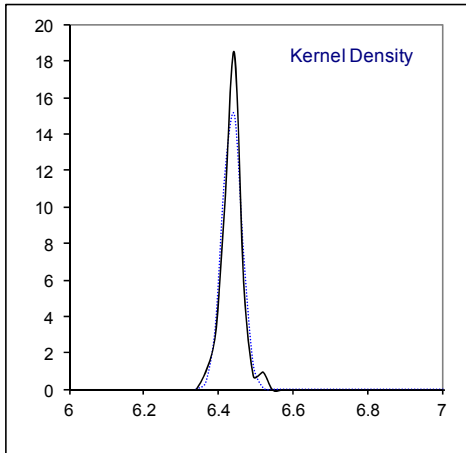
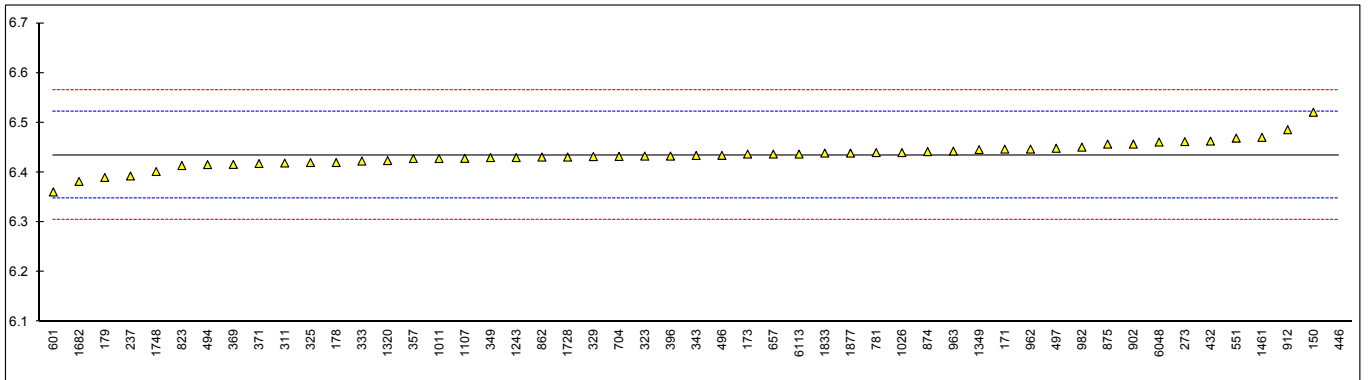
Determination of Kinematic Viscosity at 40°C on sample #17075; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150	D445	40.28		-1.01	
171	D445	40.48		0.01	
173	D445	40.46		-0.09	
178	D445	40.50		0.11	
179	D445	40.47		-0.04	
237	D445	40.15		-1.67	
273	D445	40.65		0.88	
311	D445	40.38		-0.50	
323	D445	40.35		-0.65	
325	D445	40.46		-0.09	
329	D445	40.428		-0.25	
333	D445	40.49		0.06	
343	D445	40.460		-0.09	
349	D445	40.50		0.11	
357	D445	40.52		0.21	
369	D445	40.44		-0.19	
371	D445	40.34		-0.70	
396	D445	40.74		1.33	
432	D445	40.55		0.37	
446	D445	36.09	R(0.01)	-22.32	
485		----		----	
494	D445	40.537		0.30	
496	D445	40.555		0.39	
497	D7279	40.427		-0.26	
551	D445	41.24	R(0.01)	3.88	
601		----		----	
603		----		----	
657	D445	40.54	C	0.32	First reported 39.84
704	D445	40.512		0.17	
781	D445	40.53		0.26	
823	D445	40.49		0.06	
862	D445	40.42		-0.29	
874	D445	40.46		-0.09	
875	D445	40.51		0.16	
886	D445	40.55	C	0.37	First reported as Kinematic Viscosity at 100 °C
902	D445	40.40		-0.40	
912	D445	40.58		0.52	
922	D445	40.50		0.11	
962	D445	40.51		0.16	
963	D445	40.62		0.72	
974	D445	40.54		0.32	
982	D445	40.59		0.57	
1011	D445	40.38		-0.50	
1026	D445	40.55		0.37	
1107	D445	40.504		0.13	
1243		40.29		-0.96	Method used: D7279 corrected to D445
1320	D445	40.47		-0.04	
1349	D445	40.49		0.06	
1461	ISO3104	41.0476	R(0.01)	2.90	
1682	D445	40.407		-0.36	
1728	D445	40.36		-0.60	
1748	D445	40.41		-0.35	
1833	D445	40.49		0.06	
1877	D445	40.51		0.16	
6048	ISO3104	40.555		0.39	
6113	D445	40.56		0.42	
	normality	not OK			
	n	50			
	outliers	3			
	mean (n)	40.478			
	st.dev. (n)	0.0985			
	R(calc.)	0.276			
	R(D445:17)	0.550			



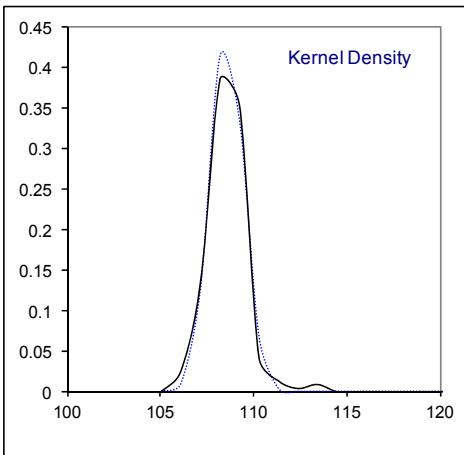
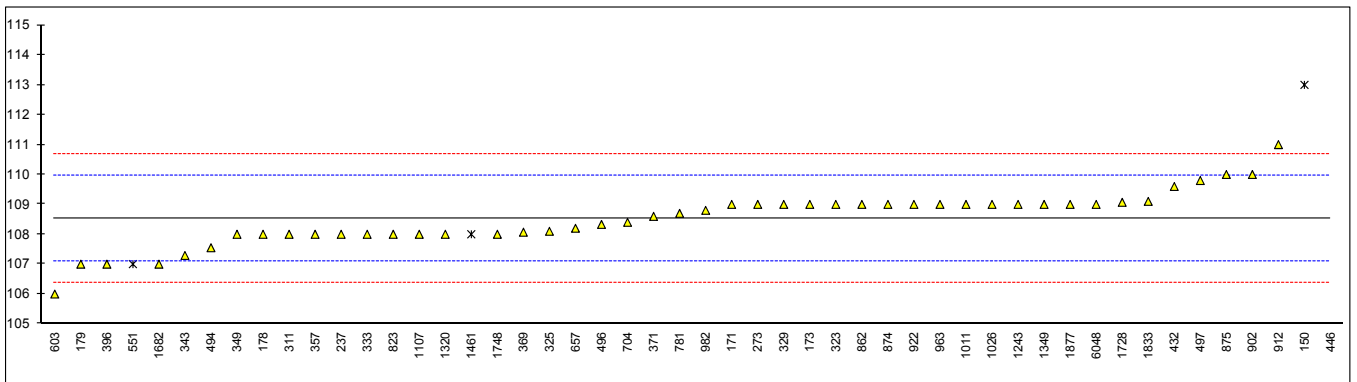
Determination of Kinematic Viscosity at 100°C on sample #17075; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150	D445	6.521		1.97	
171	D445	6.447		0.28	
173	D445	6.43695		0.05	
178	D445	6.420		-0.34	
179	D445	6.390		-1.03	
237	D445	6.393		-0.96	
273	D445	6.462		0.62	
311	D445	6.419		-0.36	
323	D445	6.433		-0.04	
325	D445	6.42		-0.34	
329	D445	6.432		-0.07	
333	D445	6.423		-0.27	
343	D445	6.4342		-0.02	
349	D445	6.430		-0.11	
357	D445	6.428		-0.16	
369	D445	6.4163		-0.43	
371	D445	6.418		-0.39	
396	D445	6.433		-0.04	
432	D445	6.463		0.64	
446	D445	12.84	R(0.01)	146.69	
485		----		----	
494	D445	6.4159		-0.43	
496	D445	6.4343		-0.01	
497	D7279	6.4487		0.32	
551	D445	6.469		0.78	
601	D445	6.361		-1.69	
603		----		----	
657	D445	6.437	C	0.05	First reported 6.462
704	D445	6.4323		-0.06	
781	D445	6.440		0.12	
823	D445	6.414		-0.48	
862	D445	6.431		-0.09	
874	D445	6.442		0.16	
875	D445	6.457		0.51	
886		----		----	First reported 40.55 (see test result previous table)
902	D445	6.457		0.51	
912	D445	6.486		1.17	
922		----		----	
962	D445	6.447		0.28	
963	D445	6.443		0.19	
974		----		----	
982	D445	6.451		0.37	
1011	D445	6.428		-0.16	
1026	D445	6.44		0.12	
1107	D445	6.4285		-0.15	
1243		6.43		-0.11	Method used: D7279 corrected to D445
1320	D445	6.424		-0.25	
1349	D445	6.446		0.25	
1461	ISO3104	6.4706		0.82	
1682	D445	6.382		-1.21	
1728	D445	6.431		-0.09	
1748	D445	6.402		-0.75	
1833	D445	6.439		0.09	
1877	D445	6.439		0.09	
6048	ISO3104	6.461		0.60	
6113	D445	6.437		0.05	
	normality	not OK			
	n	50			
	outliers	1			
	mean (n)	6.4349			
	st.dev. (n)	0.02573			
	R(calc.)	0.0721			
	R(D445:17)	0.1223			



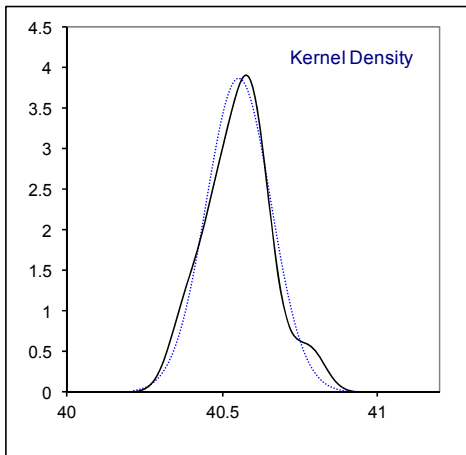
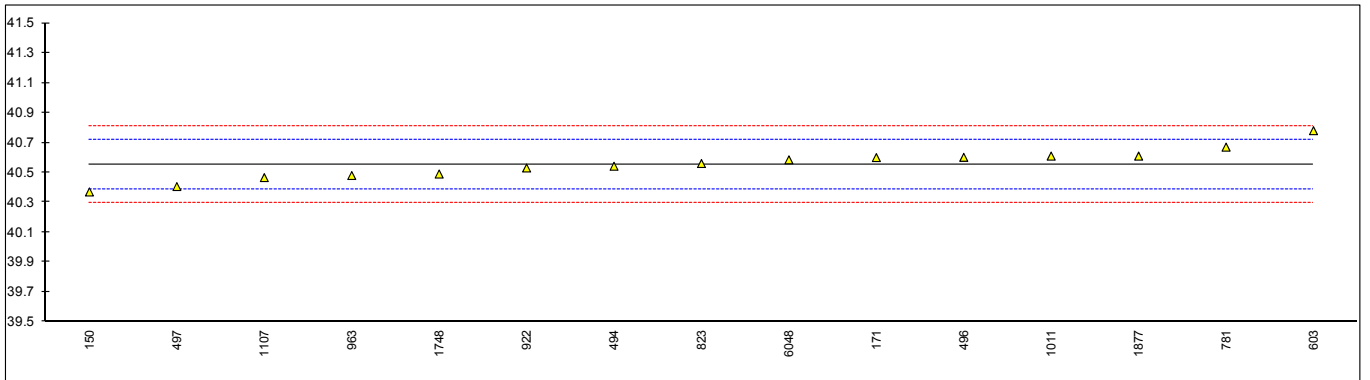
Determination of Viscosity index on sample #17075

lab	method	value	mark	z(targ)	Calc.iis	remarks
150	D2270	113	R(0.01)	6.25	113.43	
171	D2270	109		0.65	109.23	
173	D2270	109		0.65	108.88	
178	D2270	108		-0.75	107.95	
179	D2270	107		-2.15	106.76	
237	D2270	108		-0.75	108.35	
273	D2270	109		0.65	109.12	
311	D2270	108		-0.75	108.44	
323	D2270	109		0.65	109.20	
325	D2270	108.1		-0.61	108.13	
329	D2270	109		0.65	108.80	
333	D2270	108		-0.75	108.12	
343	D2270	107.29	E	-1.74	108.75	Calculation error?
349	D2270	108		-0.75	108.39	
357	D2270	108		-0.75	108.21	
369	D2270(B)	108.07		-0.65	108.05	
371	D2270	108.6		0.09	108.58	
396	D2270	107		-2.15	107.44	
432	D2270	109.6		1.49	109.62	
446	D2270	371	ex	367.45	371.26	Outlier in viscosity at 40°C and 100°C
485		----		----	----	
494	D2270	107.55		-1.38	107.60	
496	D2270	108.33		-0.29	108.33	
497	D2270	109.8		1.77	109.55	
551	D2270	107	ex	-2.15	106.80	Outlier in viscosity at 40°C
601		----		----	----	
603	D2270	106		-3.55	----	
657	D2270	108.2	C	-0.47	108.52	First reported 112.8
704	D2270	108.4		-0.19	108.43	
781	D2270	108.7		0.23	108.69	
823	D2270	108		-0.75	107.72	
862	D2270	109		0.65	108.80	
874	D2270	109		0.65	109.10	
875	D2270	110		2.05	109.53	
886		----		----	----	
902	D2270	110		2.05	110.04	
912	D2270	111		3.45	110.49	
922	D2270	109.0		0.65	----	
962		----		----	109.09	
963	D2270	109	E	0.65	108.42	Calculation error?
974		----		----	----	
982	D2270	108.8		0.37	108.91	
1011	D2270	109		0.65	108.84	
1026	D2270	109		0.65	108.60	
1107	D2270	108		-0.75	108.30	
1243	ISO2909	109		0.65	109.34	
1320	D2270	108		-0.75	108.26	
1349	D2270	109		0.65	109.14	
1461	ISO2909	108	ex	-0.75	107.71	Outlier in viscosity at 40°C
1682	D2270	107		-2.15	106.70	
1728	D2270	109.07		0.75	109.07	
1748	D2270	108		-0.75	107.55	
1833	ISO2909	109.1		0.79	108.83	
1877	D2270	109		0.65	108.74	
6048	ISO2909	109		0.65	109.51	
6113		----		----	108.43	
	normality	suspect			OK	
	n	46			46	
	outliers	1 (+3 ex)			1 (+3 ex)	
	mean (n)	108.53			108.62	
	st.dev. (n)	0.901			0.750	
	R(calc.)	2.52			2.10	
	R(D2270:10)	2			2	



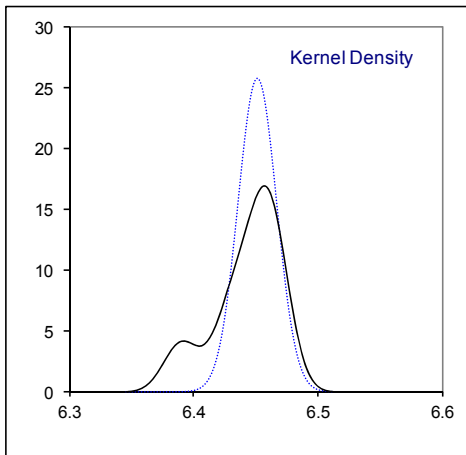
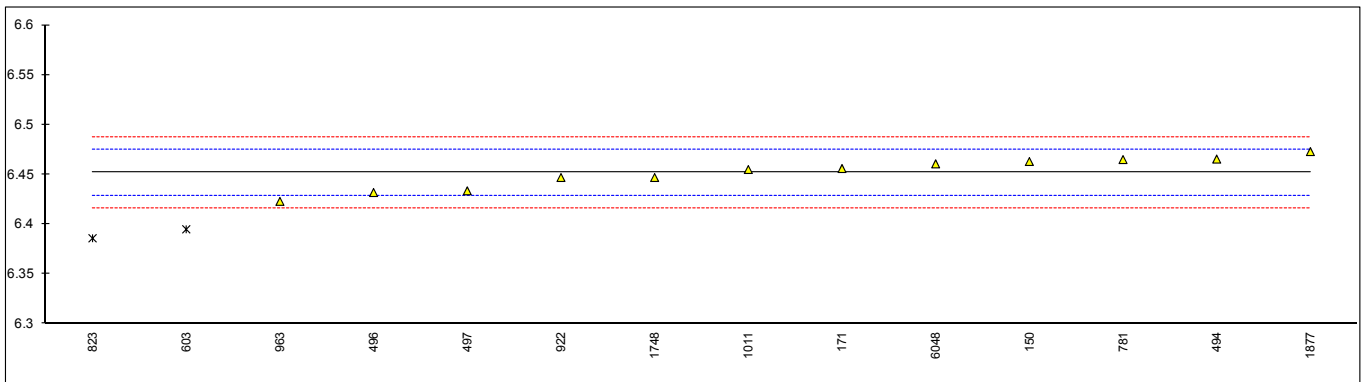
Determination of Viscosity Stabinger at 40 °C on sample #17075; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150	D7042	40.37		-2.17	
171	D7042	40.60		0.55	
173		----		----	
178		----		----	
179		----		----	
237		----		----	
273		----		----	
311		----		----	
323		----		----	
325		----		----	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494	D7042	40.542		-0.13	
496	D7042	40.6015		0.57	
497	D7042	40.406		-1.74	
551		----		----	
601		----		----	
603	D7042	40.78		2.68	
657		----		----	
704		----		----	
781	D7042	40.67		1.38	
823	D7042	40.56		0.08	
862		----		----	
874		----		----	
875		----		----	
886		----		----	
902		----		----	
912		----		----	
922	D7042	40.53		-0.28	
962		----		----	
963	D7042	40.48		-0.87	
974		----		----	
982		----		----	
1011	D7042	40.61		0.67	
1026		----		----	
1107	D7042	40.466		-1.03	
1243		----		----	
1320		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1728		----		----	
1748	D7042	40.49		-0.75	
1833		----		----	
1877	D7042	40.61		0.67	
6048	D7042	40.585		0.37	
6113		----		----	
	normality	OK			
	n	15			
	outliers	0			
	mean (n)	40.553			
	st.dev. (n)	0.10350			
	R(calc.)	0.290			
	R(D7042:16e3)	0.237			



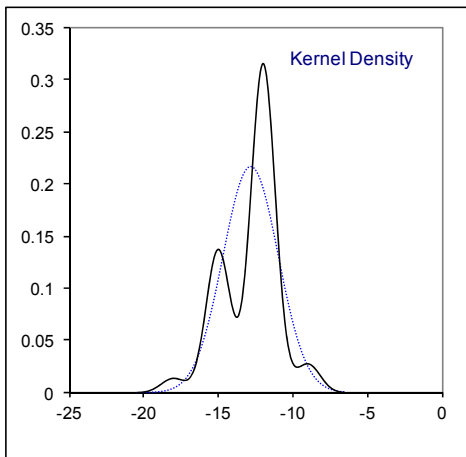
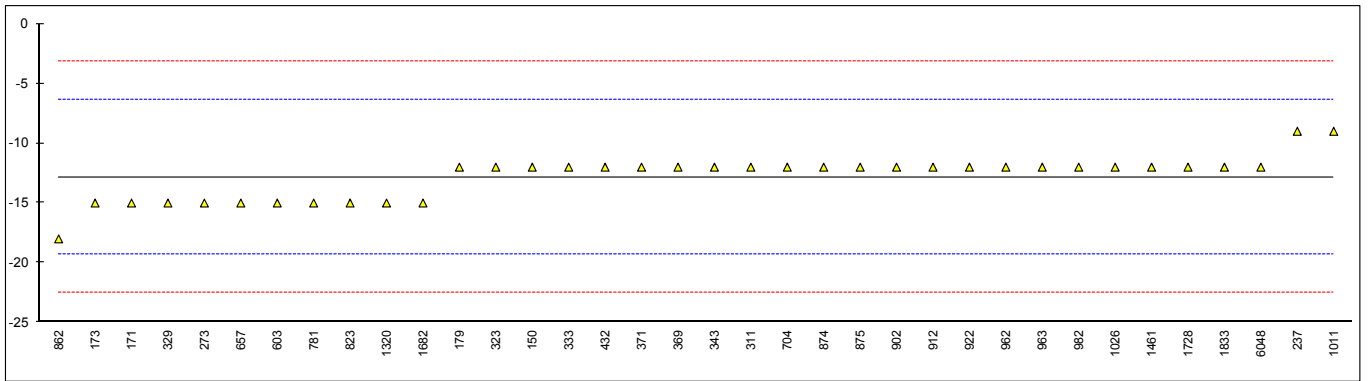
Determination of Viscosity Stabinger at 100 °C on sample #17075; results in mm²/s

lab	method	value	mark	z(targ)	remarks
150	D7042	6.463		0.95	
171	D7042	6.456		0.36	
173		----		----	
178		----		----	
179		----		----	
237		----		----	
273		----		----	
311		----		----	
323		----		----	
325		----		----	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494	D7042	6.4655		1.17	
496	D7042	6.43195		-1.67	
497	D7042	6.4336		-1.53	
551		----		----	
601		----		----	
603	D7042	6.395	DG(0.05)	-4.80	
657		----		----	
704		----		----	
781	D7042	6.465		1.12	
823	D7042	6.386	DG(0.05)	-5.56	
862		----		----	
874		----		----	
875		----		----	
886		----		----	
902		----		----	
912		----		----	
922	D7042	6.447		-0.40	
962		----		----	
963	D7042	6.423		-2.43	
974		----		----	
982		----		----	
1011	D7042	6.455		0.28	
1026		----		----	
1107		----		----	
1243		----		----	
1320		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1728		----		----	
1748	D7042	6.447		-0.40	
1833		----		----	
1877	D7042	6.473		1.80	
6048	D7042	6.4607		0.76	
6113		----		----	
	normality	OK			
	n	12			
	outliers	2			
	mean (n)	6.4517			
	st.dev. (n)	0.01551			
	R(calc.)	0.0434			
	R(D7042:16e3)	0.0331			



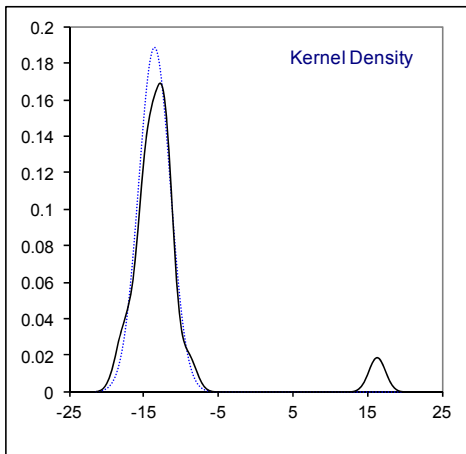
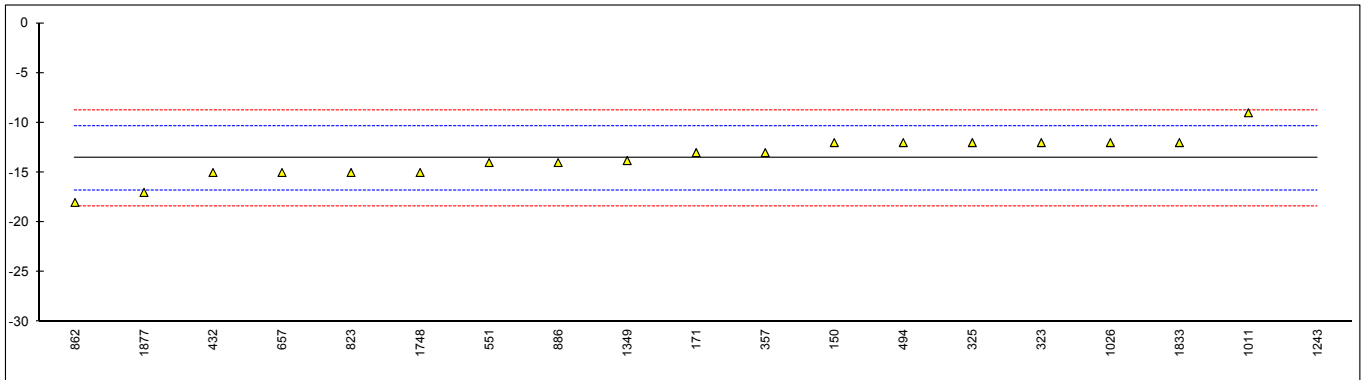
Determination of Pour Point manual on sample #17075; results in °C

lab	method	value	mark	z(targ)	remarks
150	D97	-12		0.26	
171	D97	-15		-0.67	
173	D97	-15		-0.67	
178		----		----	
179	D97	-12		0.26	
237	D97	-9		1.19	
273	D97	-15		-0.67	
311	D97	-12		0.26	
323	D97	-12		0.26	
325		----		----	
329	D97	-15		-0.67	
333	D97	-12		0.26	
343	D97	-12		0.26	
349		----		----	
357		----		----	
369	D97	-12		0.26	
371	D97	-12		0.26	
396		----		----	
432	D97	-12		0.26	
446		----		----	
485		----		----	
494		----		----	
496		----		----	
497		----		----	
551		----		----	
601		----		----	
603	D97	-15		-0.67	
657	D97	-15		-0.67	
704	D97	-12		0.26	
781	D97	-15		-0.67	
823	D97	-15		-0.67	
862	D97	-18		-1.61	
874	D97	-12		0.26	
875	D97	-12		0.26	
886		----		----	
902	D97	-12		0.26	
912	D97	-12		0.26	
922	D97	-12		0.26	
962	D97	-12		0.26	
963	D97	-12		0.26	
974		----		----	
982	D97	-12		0.26	
1011	D97	-9		1.19	
1026	D97	-12		0.26	
1107		----		----	
1243		----		----	
1320	D97	-15		-0.67	
1349		----		----	
1461	ISO3016	-12		0.26	
1682	D97	-15		-0.67	
1728	D97	-12		0.26	
1748		----		----	
1833	ISO3016	-12		0.26	
1877		----		----	
6048	D97	-12		0.26	
6113		----		----	
	normality	OK			
	n	36			
	outliers	0			
	mean (n)	-12.83			
	st.dev. (n)	1.844			
	R(calc.)	5.16			
	R(D97:17)	9			



Determination of Pour Point automated 1°C int. on sample #17075; results in °C

lab	method	value	mark	z(targ)	remarks
150	D5950	-12		0.96	
171	D5950	-13		0.34	
173		----		----	
178		----		----	
179		----		----	
237		----		----	
273		----		----	
311		----		----	
323	D5950	-12		0.96	
325	D5950	-12		0.96	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357	D5950	-13		0.34	
369		----		----	
371		----		----	
396		----		----	
432	D5950	-15		-0.91	
446		----		----	
485		----		----	
494	D5950	-12		0.96	
496		----		----	
497		----		----	
551	D5950	-14		-0.28	
601		----		----	
603		----		----	
657	D5950	-15		-0.91	
704		----		----	
781		----		----	
823	D5950	-15		-0.91	
862	D5950	-18	C	-2.77	First reported -20
874		----		----	
875		----		----	
886	D5950	-14		-0.28	
902		----		----	
912		----		----	
922		----		----	
962		----		----	
963		----		----	
974		----		----	
982		----		----	
1011	D6892	-9		2.83	
1026	D5950	-12		0.96	
1107		----		----	
1243	D7346	16.4	G(0.01)	18.63	
1320		----		----	
1349	INH-1762	-13.8		-0.16	
1461		----		----	
1682		----		----	
1728		----		----	
1748	D5950	-15		-0.91	
1833	D5950	-12		0.96	
1877	D5950	-17		-2.15	
6048		----		----	
6113		----		----	
	normality	OK			
	n	18			
	outliers	1			
	mean (n)	-13.54			
	st.dev. (n)	2.119			
	R(calc.)	5.93			
	R(D5950:14)	4.5			



Determination of Rust prevention (proc.B) on sample #17075

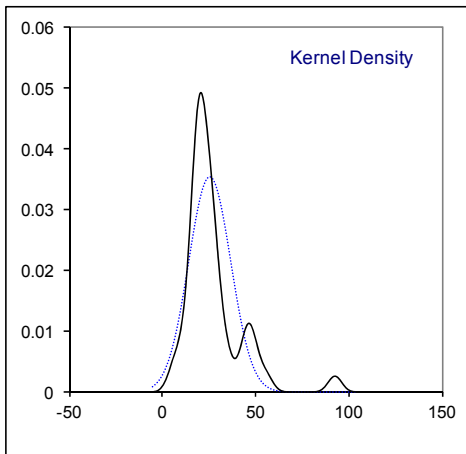
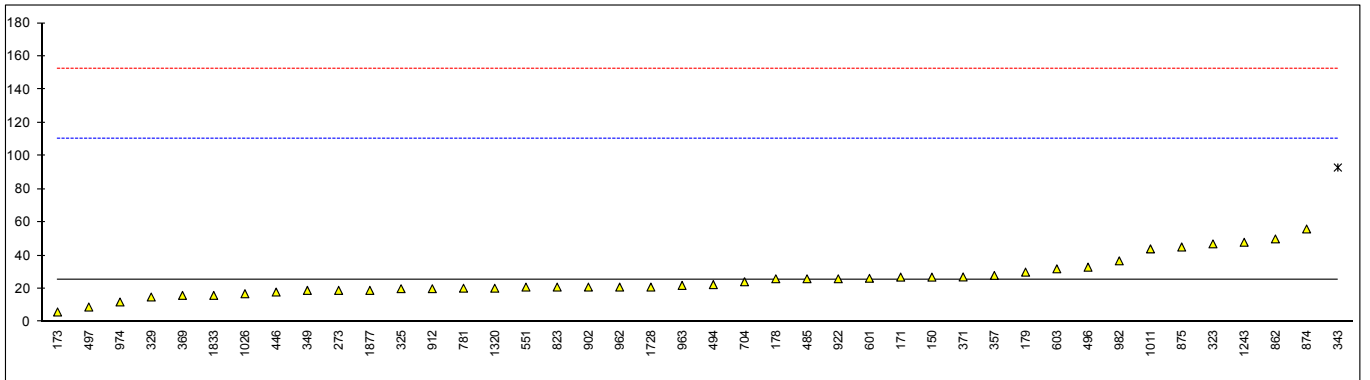
lab	method	value	mark	z(targ)	remarks
150		----		----	
171		----		----	
173		----		----	
178		----		----	
179	D665	Fail		----	
237		----		----	
273		----		----	
311	D665	Fails		----	
323		----		----	
325	D665	Severe		----	
329		----		----	
333		----		----	
343		----		----	
349		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494		----		----	
496		----		----	
497		----		----	
551		----		----	
601		----		----	
603		----		----	
657		----		----	
704		----		----	
781		----		----	
823		----		----	
862	D665	Severe Rusting		----	
874		----		----	
875		----		----	
886		----		----	
902		----		----	
912	D665	Pass		----	
922		----		----	
962		----		----	
963		----		----	
974		----		----	
982		----		----	
1011		----		----	
1026		----		----	
1107		----		----	
1243		----		----	
1320		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1728		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
6048		----		----	
6113		----		----	
	reported	4 fail, 1 pass			

Determination of Sulphur on sample #17075; results in %mg/kg

lab	method	value	mark	z(targ)	remarks
150	D2622	<3.0		----	
171	D2622	0.2		----	
173		----		----	
178		----		----	
179		----		----	
237		----		----	
273	D5453	<1		----	
311	D2622	<3	C	----	First reported 0.0011% M/M
323	D2622	< 3.0		----	
325		<1		----	
329		----		----	
333		----		----	
343	IP336	0.000		----	
349	D2622	0.22		----	
357		----		----	
369	D2622	<3		----	
371	D5453	0.25		----	
396		----		----	
432		----		----	
446		----		----	
485		----		----	
494	ISO20846	0.246		----	
496		----		----	
497		----		----	
551		----		----	
601		----		----	
603		----		----	
657	D5453	1.6		----	
704	ISO20846	<3		----	
781	ISO20846	<3.0		----	
823	D5453	0.1		----	
862	D2622	<3		----	
874	D2622	<3		----	
875	D2622	1.901		----	
886		----		----	
902	D5453	<0.5		----	
912		----		----	
922	D4294	<17		----	
962		----		----	
963		----		----	
974		----		----	
982		----		----	
1011	IP336	<60		----	
1026	D2622	<5		----	
1107		----		----	
1243	ISO8754	4.1	C	----	First reported 41
1320		----		----	
1349	D7039	0.4		----	
1461		----		----	
1682		----		----	
1728	D2622	<3		----	
1748		----		----	
1833	IP336	<300		----	Reported 0.03
1877		----		----	
6048	ISO20884	0.2		----	
6113		----		----	
	normality	n.a.			
	n	22			
	outliers	n.a.			
	mean (n)	<3			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D2622:16)	n.a.			Application range: 3 mg/kg – 4.6 %M/M

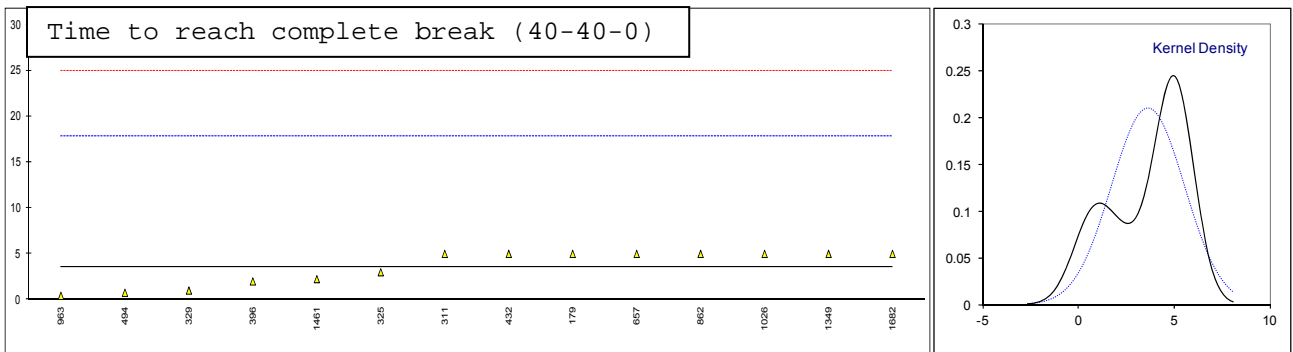
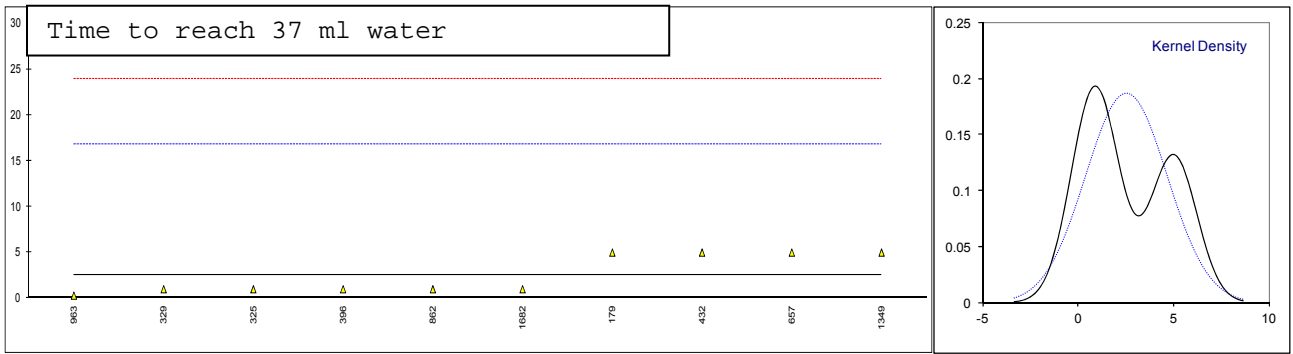
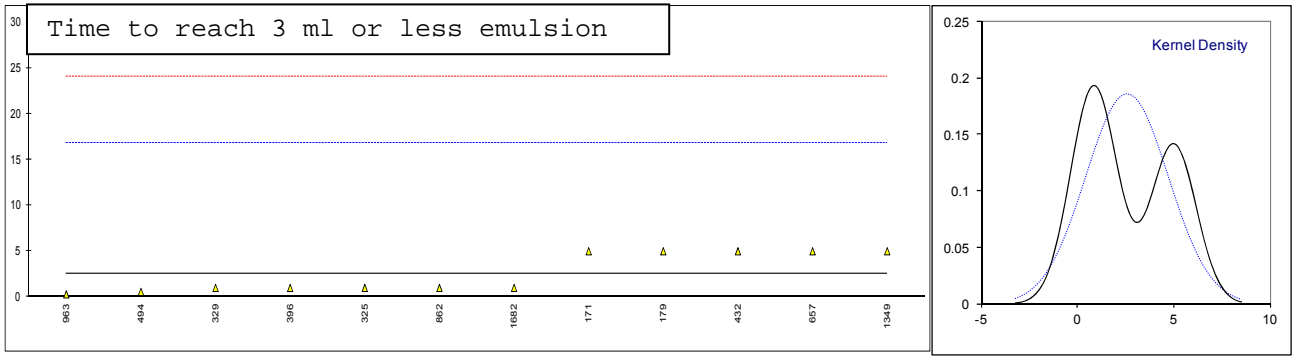
Determination of Water content by KF on sample #17075; results in mg/kg

lab	method	value	mark	z(targ)	remarks
150	D6304-A	27		0.03	
171	D6304-A	27		0.03	
173	D6304-C	6		-0.47	
178	D6304-C	26		0.01	
179	D6304-C	30		0.10	
237		----		----	
273	D6304-A	19		-0.16	
311		----		----	
323	D6304-A	47		0.50	
325	D6304-C	20		-0.14	
329	D6304-A	15		-0.25	
333		----		----	
343	E203	93	R(0.01)	1.59	
349	D6304-A	19		-0.16	
357	D6304-A	28		0.05	
369	D6304-A	16		-0.23	
371	D6304-A	27.1		0.03	
396		----		----	
432		----		----	
446	D6304-A	18		-0.18	
485	D6304-A	26		0.01	
494	D6304-B	22.5		-0.08	
496	D6304-A	33		0.17	
497	D6304-C	9		-0.40	
551	D6304-A	21		-0.11	
601	D6304-A	26.3		0.01	
603	D6304-C	32		0.15	
657	D6304-C	<10		----	
704	D6304-A	24.2		-0.04	
781	D6304-A	20.3		-0.13	
823	D6304-A	21		-0.11	
862	D6304-A	50		0.57	
874	D6304-A	56		0.71	
875	D6304-A	45.132		0.46	
886		----		----	
902	D6304-A	21		-0.11	
912	D6304-C	20		-0.14	
922	D6304-A	26.0		0.01	
962	D6304-A	21		-0.11	
963	D6304-A	22		-0.09	
974	D6304-A	12		-0.32	
982	D6304-A	36.80		0.26	
1011	D6304-A	44		0.43	
1026	D6304-A	17		-0.21	
1107		----		----	
1243	DIN51777	48		0.53	
1320	ISO12937	20.3		-0.13	
1349		----		----	
1461		----		----	
1682		----		----	
1728	D6304-A	21		-0.11	
1748		----		----	
1833	D6304-A	16		-0.23	
1877	D6304-C	19		-0.16	
6048	ISO12937	<10		----	
6113		----		----	
	normality	suspect			
	n	41			
	outliers	1			
	mean (n)	25.75			
	st.dev. (n)	11.297			
	R(calc.)	31.63			
	R(D6304:16e1)	118.61			



Determination of Water Separability at 54°C on sample #17075; results in minutes

lab	method	time to reach 3 ml or less emulsion	mark	z(targ)	time to reach 37 ml of water	mark	z(targ)	time to reach complete break (40-40-0)	mark	z(targ)	time test aborted
150		----		----	----		----	----		----	----
171	D1401	5		0.34	----		----	----		----	NO
173		----		----	----		----	----		----	----
178		----		----	----		----	----		----	----
179	D1401	5		0.34	5		0.35	5		0.21	NO
237		----		----	----		----	----		----	----
273		----		----	----		----	----		----	----
311		<5		----	<5		----	5		0.21	NO
323	D1401	< 5		----	< 5		----	< 5		----	----
325	D1401	1		-0.22	1		-0.21	3		-0.07	NO
329	D1401	1		-0.22	1		-0.21	1		-0.35	NO
333		----		----	----		----	----		----	----
343		----		----	----		----	----		----	----
349		----		----	----		----	----		----	----
357		----		----	----		----	----		----	----
369		----		----	----		----	----		----	----
371		----		----	----		----	----		----	----
396	D1401	1		-0.22	1		-0.21	2		-0.21	NO
432	D1401	5		0.34	5		0.35	5		0.21	NO
446		----		----	----		----	----		----	----
485		----		----	----		----	----		----	----
494	D1401	0.57		-0.28	----		----	0.76		-0.39	----
496		----		----	----		----	----		----	----
497		----		----	----		----	----		----	----
551		----		----	----		----	----		----	----
601		----		----	----		----	----		----	----
603		----		----	----		----	----		----	----
657	D1401	5		0.34	5		0.35	5		0.21	NO
704		----		----	----		----	----		----	----
781		----		----	----		----	----		----	----
823	D1401	----		----	----		----	----		----	NO
862	D1401	1		-0.22	1		-0.21	5		0.21	NO
874		----		----	----		----	----		----	----
875		----		----	----		----	----		----	----
886		----		----	----		----	----		----	----
902		----		----	----		----	----		----	----
912		----		----	----		----	----		----	----
922		----		----	----		----	----		----	----
962		----		----	----		----	----		----	----
963	D1401	0.3		-0.32	0.3		-0.31	0.43		-0.43	NO
974		----		----	----		----	----		----	----
982		----		----	----		----	----		----	----
1011		----		----	----		----	----		----	----
1026	D1401	----		----	----		----	5		0.21	YES
1107		----		----	----		----	----		----	----
1243		----		----	----		----	----		----	NO
1320	ISO6614	----		----	----		----	----		----	----
1349	D1401	5		0.34	5		0.35	5		0.21	YES
1461	ISO6614	----		----	----		----	2min 15 sek		-0.18	NO
1682		1		-0.22	1		-0.21	5		0.21	NO
1728		----		----	----		----	----		----	----
1748		----		----	----		----	----		----	----
1833		----		----	----		----	----		----	----
1877		----		----	----		----	----		----	----
6048		----		----	----		----	----		----	----
6113		----		----	----		----	----		----	----
	normality	OK			OK			OK			
	n	12			10			14			
	outliers	0			0			0			
	mean (n)	2.57			2.53			3.53			
	st.dev. (n)	2.153			2.136			1.865			
	R(calc.)	6.03			5.98			5.22			
	R(D1401:12e1)	20			20			20			



Determination of Water Separability at 54°C sample #17075; results in ml

lab	method	volume oil phase	volume water phase	volume emulsion phase
150		----	----	----
171	D1401	42	38	0
173		----	----	----
178		----	----	----
179	D1401	40	40	0
237		----	----	----
273		----	----	----
311		40	40	0
323		----	----	----
325		----	----	----
329		----	----	----
333		----	----	----
343		----	----	----
349		----	----	----
357		----	----	----
369		----	----	----
371		----	----	----
396	D1401	40	40	0
432	D1401	40	40	0
446		----	----	----
485		----	----	----
494	D1401	40	40	0
496		----	----	----
497		----	----	----
551		----	----	----
601		----	----	----
603		----	----	----
657	D1401	40	40	0
704		----	----	----
781		----	----	----
823		----	----	----
862	D1401	40	40	0
874		----	----	----
875		----	----	----
886		----	----	----
902		----	----	----
912		----	----	----
922		----	----	----
962		----	----	----
963	D1401	40	40	0
974		----	----	----
982		----	----	----
1011		----	----	----
1026	D1401	40	40	0
1107		----	----	----
1243		40	40	0
1320	ISO6614	41	39	0
1349	D1401	40	40	0
1461	ISO6614	40	40	0
1682		----	----	----
1728		----	----	----
1748		----	----	----
1833		----	----	----
1877		----	----	----
6048		----	----	----
6113		----	----	----

APPENDIX 2

Number of participants per country

1 lab in ALGERIA
1 lab in AUSTRIA
5 labs in BELGIUM
1 lab in BRAZIL
1 lab in BULGARIA
1 lab in CHINA, People's Republic
1 lab in FINLAND
1 lab in FRANCE
5 labs in GERMANY
1 lab in INDIA
1 lab in IRAN, Islamic Republic of
1 lab in ITALY
1 lab in JORDAN
2 labs in LATVIA
2 labs in MALAYSIA
2 labs in NETHERLANDS
1 lab in NIGERIA
1 lab in PAKISTAN
1 lab in POLAND
1 lab in PORTUGAL
1 lab in ROMANIA
3 labs in RUSSIAN FEDERATION
2 labs in SAUDI ARABIA
1 lab in SINGAPORE
1 lab in SLOVAKIA
1 lab in SOUTH AFRICA
1 lab in SOUTH KOREA
3 labs in SPAIN
1 lab in TAIWAN
2 labs in TURKEY
1 lab in UKRAINE
1 lab in UNITED ARAB EMIRATES
2 labs in UNITED KINGDOM
5 labs in UNITED STATES OF AMERICA

APPENDIX 3

Abbreviations:

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

Literature:

- 1 iis Interlaboratory Studies, Protocol for the Organization, Statistics and Evaluation, March 2017
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