

Results of Proficiency Test
Base Oil (fresh)
May 2015

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2013, the Institute for Interlaboratory Studies organises every year a proficiency test for Base Oil. In the annual proficiency testing program 2014/2015, it was decided to continue the proficiency test for the analyses of Base Oil. In this interlaboratory study 45 laboratories in 32 different countries have participated. See appendix 2 for the number of participants per country. In this report, the results of the 2015 Base Oil proficiency test are presented and discussed. This report is also electronically available through the iis internet site www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test. It was decided to send one bottle of 1L (labelled #15055) of Base Oil that was purchased from a local supplier. The analyses for fit-for-use and homogeneity were subcontracted. Participants were requested to report rounded and unrounded results. The unrounded 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 was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of April 2014 (iis-protocol, version 3.3). This protocol can be downloaded via the FAQ page of the iis internet site www.iisnl.com.

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 (a Premium Base 220R) was homogenized and part of this bulk was transferred into 62 brown glass bottles of 1 litre (labelled #15055). The homogeneity of the subsamples #15055 was checked by determination of Density at 15°C in accordance with ASTM D4052 and Kinematic Viscosity at 40°C in accordance with ASTM D445 on 8 stratified randomly selected samples.

	Density at 15 °C in kg/L	Kinematic Viscosity at 40°C in mm ² /s
Sample #15055-1	0.86064	40.25
Sample #15055-2	0.86064	40.23
Sample #15055-3	0.86063	40.22
Sample #15055-4	0.86062	40.22
Sample #15055-5	0.86063	40.24
Sample #15055-6	0.86063	40.19
Sample #15055-7	0.86063	40.19
Sample #15055-8	0.86063	40.25

Table 1: homogeneity test results of subsamples #15055

From the above test results, the repeatabilities were calculated and compared with 0.3 times the corresponding reproducibilities in agreement with the procedure of ISO 13528, Annex B2 in the next table:

	Density at 15 °C in kg/L	Kinematic Viscosity at 40°C in mm ² /s
r (sample #15055)	0.00001	0.06
reference test	ASTM D4052:11	ASTM D445:15
0.3 x R(reference test)	0.00015	0.16

Table 2: evaluation of the repeatabilities of the subsamples #15055

The calculated repeatabilities were less than 0.3 times the corresponding reproducibilities of the reference test methods. Therefore, homogeneity of the subsample #15055 was assumed.

To each of the participating laboratories, one sample of 1 L in a brown glass bottle (labelled #15055) was sent on May 15, 2015.

2.5 ANALYSES

The participants were requested to determine on sample #15055: Acid Number (Total), Air-release time at 50°C, Color, 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.

To get comparable results a detailed report form, on which the units were prescribed as well as the required standards and a letter of instructions were prepared and made available on the data entry portal www.kpmd.co.uk/sgs-iis/. The detailed report form was also made available for download on the iis website www.iisnl.com. A SDS and a form to confirm receipt of the samples were added to the sample package.

3 RESULTS

During four weeks after sample despatch, the results of the individual laboratories were gathered. The original data are tabulated per determination in the appendix of this report. The laboratories are presented by their code numbers.

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

Shortly after the deadline, the available results were screened for suspect data. A 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 results. Additional or corrected results are used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1.

3.1 STATISTICS

Statistical calculations were performed as described in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' (iis-protocol, version 3.3) of April 2014.

For statistical evaluation the *unrounded* (when available) figures were used instead of the rounded results. 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. Not all data sets proved to have a normal distribution, in which cases the statistical evaluation of the results should be used with due care.

According to ISO 5725 the original results per determination were submitted to Dixon's and/or 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 (ref. 15). 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 these 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 analysis results are plotted. The corresponding laboratory numbers are under 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 standard. 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. The Kernel Density Graph 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 (see appendix 3; nos.13 and 14).

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 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:

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

Absolute values for $z < 2$ are very common and absolute values for $z > 3$ are very rare.

Therefore, the usual interpretation of z-scores is as follows:

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

4 EVALUATION

In this proficiency test, some problems were encountered during the execution. Six participants reported the test results after the final reporting date and two participants did not report any test results at all. Not all laboratories were able to report all analyses requested. In total 43 participants reported 397 test results. Observed were 11 outlying results, which is 2.8% 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 sample and 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. One statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is in agreement with the requirements of ASTM D974:14. When the ASTM D974 data were evaluated separately, the calculated reproducibility is somewhat smaller and again in agreement with the requirements of ASTM D974:12.

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 agreement with the requirements of ASTM D3427:12.

- Color: This determination was not problematic. No statistical outliers were observed.
- Conradson CR: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D189:06(2014).
- Ramsbottom CR: Regretfully, only four test results were reported. This determination may be problematic. The calculated reproducibility is not in agreement with the requirements of ASTM D524:10.
- Density at 15°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 D4052:11.
- Evaporation loss: by Noack test 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 D5800:15-proc B.
One participant reported to have used the method CEC L-040-93, which is equivalent to ASTM D5800, except this method uses a known correction factor.
- Flash Point COC: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with ASTM D92:12b.
- Kin.Visco.at 40°C: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D445:15.
- Kin.Visco.at 100°C: 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 D445:15.
- Viscosity Index: This determination was problematic. One statistical outlier was observed. The calculated reproducibility after rejection of the statistical outlier is in not agreement with ASTM D2270:10e1. Thirty reported test results were rounded to nearest whole number, as is described in the test method. This means that almost all participants submitted rounded results which might explain (part of) the high spread found. This is the reason that participants are advised to report unrounded results during the round robin. One participant used the Stabinger viscosity result to calculate the viscosity index. Although this is allowed by the method (ASTM D2270), the differences reported for this PT sample for both

kinematic and Stabinger viscosities by single laboratories are significant and thus will have an impact on the viscosity index result.

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 three statistical outliers is in full agreement with ASTM D2270:10e1. 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 very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with ASTM D7042:14. The small number of reported results may explain (partly) the spread.

Visco. Stabinger at 100°C: This determination was very problematic. No statistical outliers were observed. However, the calculated reproducibility is not at all in agreement with ASTM D7042:14. The small number of reported results may explain (partly) the spread.

Pour Point: manual 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 D97:12.

Pour Point: automated This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements of ASTM D5950:14.

Rust prevention: Regretfully, only six participants reported a test result. Five reported the presence of rust (Fail), while one participant reported the test as "Pass".

Sulphur: The consensus value of the group was below the application range (3 mg/kg – 4.6 %M/M) of ASTM D2622:10. Therefore, no significant conclusions were drawn. One false positive test result was observed, possibly due to a unit error.

Water: 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 D6304:07.

Water separability: This determination was not problematic. No statistical outliers were observed. The calculated reproducibilities are in good agreement with the requirements of ASTM D1401:12.

ASTM D1401 describes complete break only as '40-40-0', whereas a complete break also was interpreted as 'no emulsion layer present'.

All participants, except one, reported the complete break as 40-40-0.

One participant reported the complete break as 40-39-1.

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	21	0.013	0.027	0.040
Air-release time at 50°C	Min	6	1.8	1.4	1.7
Color		40	L0.5	n.a.	n.a.
Conradson Carbon Residue	%M/M	12	0.008	0.017	0.021
Ramsbottom Carbon Residue	%M/M	4	0.047	0.035	0.027
Density at 15 °C	kg/L	39	0.8607	0.0006	0.0005
Evaporation loss by Noack	%M/M	10	9.11	0.78	1.25
Flash Point COC	°C	34	234	15	18
Kinematic Viscosity at 40 °C	mm ² /s	36	40.48	0.40	0.55
Kinematic Viscosity at 100 °C	mm ² /s	33	6.432	0.048	0.122
Viscosity Index		35	108.5	2.8	2.0
Stabinger Viscosity at 40 °C	mm ² /s	9	40.58	0.71	0.24
Stabinger Viscosity at 100 °C	mm ² /s	9	6.446	0.100	0.033
Pour Point manual	°C	25	-12.2	4.1	9.0
Pour Point automated	°C	15	-13.4	4.9	4.5
Rust Prevention (proc. B)		6	fail	n.a.	n.a.
Sulphur	mg/kg	14	<3	n.a.	n.a.
Water	mg/kg	27	21.2	17.9	105.6
Water Separability at 54°C					
- Time to reach 3 ml or less emulsion	min	8	3.6	6.5	20.0
- Time to reach 37 of water	min	8	3.3	6.5	20.0

Table 3: reproducibilities of results of sample #15055

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 2015 WITH PREVIOUS PTS

	May 2015	May 2014	May 2013
Number of reporting labs	43	43	28
Number of results reported	397	408	260
Statistical outliers	11	19	17
Percentage outliers	2.8%	4.7%	6.5%

Table 4: comparison with previous proficiency tests

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

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

The conclusions are given in the following table:

Determination	May 2015	May 2014	May 2013
Acid Number, Total	+	+/-	+/-
Air-release time at 50°C	+	-	n.e.
Color	n.e.	+	++
Conradson Carbon Residue	+	++	-
Ramsbottom Carbon Residue	-	--	n.e.
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.	n.e.
Rust Prevention	n.e.	n.e.	n.e.
Sulphur	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:

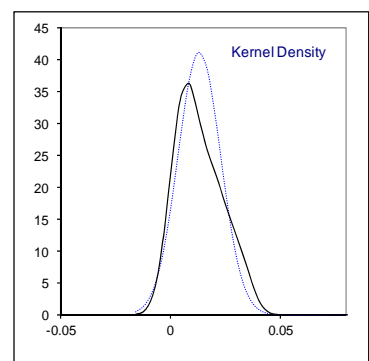
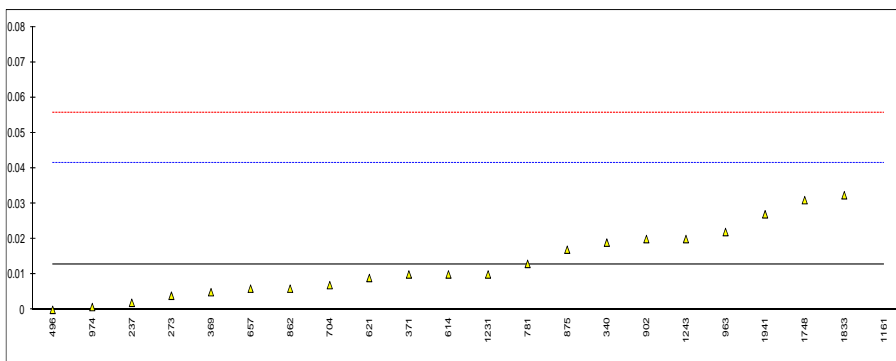
- ++: group performed much better than the standard
- + : group performed better than the standard
- +/-: group performance equals the standard
- : group performed worse than the standard
- : group performed much worse than the standard
- n.e.: not evaluated

APPENDIX 1

Determination of Acid Number (Total) on sample #15055; results in mg KOH/g

lab	method	value	mark	z(targ)	remarks
237	D974	0.002		-0.76	
273	D974	0.004		-0.62	
311	D974	<0.02		----	
315		----		----	
323	D974	<0.02		----	
337		----		----	
340	D974	0.019		0.43	
357	D664	<0.05		----	
369	D974	0.005		-0.55	
371	D974	0.01		-0.20	
396		----		----	
432		----		----	
445		----		----	
446	D974	<0.02		----	
485		----		----	
494	D664	<0.05		----	
496	D974	0.000		-0.90	
541	D974	<0.1		----	
551		----		----	
601		----		----	
614	D974	0.01		-0.20	
621	D664	0.009		-0.27	
657	D974	0.006		-0.48	
704	D974	0.007		-0.41	
781	D974	0.013		0.01	
862	D974	0.006		-0.48	
875	D664	0.017		0.29	
902	D664	0.02		0.50	
922	D664	<0.10		----	
963	D974	0.022		0.64	
974	D974	0.0008		-0.85	
1011	D974	<0.02		----	
1026	D974	<0.03		----	
1161	D664	1.002	R(0.01)	69.24	possibly a unit error?
1231	D664	0.01		-0.20	
1243	D974	0.02		0.50	
1349		----		----	
1461		----		----	
1682		----		----	
1748	D664	0.031		1.27	
1833	D664	0.0324		1.36	
1877		----		----	
1941	ISO6618	0.027		0.99	
1963		----		----	
1971		----		----	

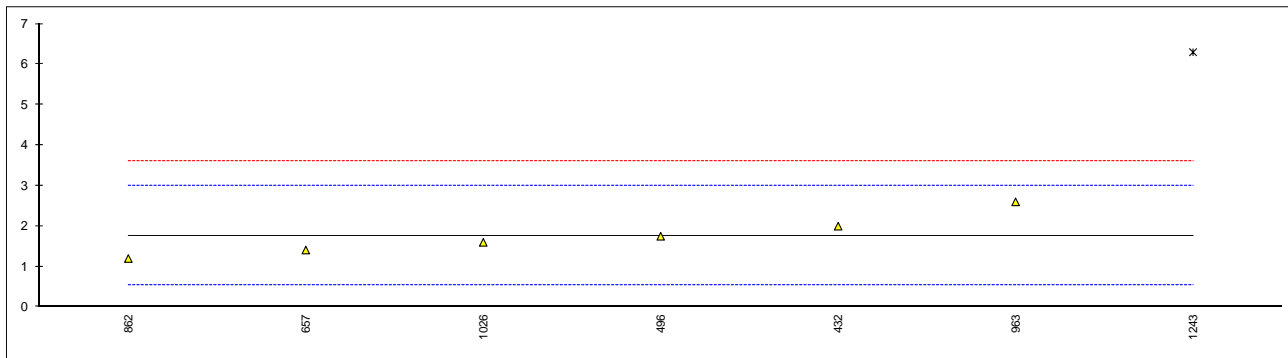
		<u>Only ASTM D974 data</u>
normality	OK	OK
n	21	16
outliers	1	0
mean (n)	0.0129	0.0100
st.dev. (n)	0.00972	0.00806
R(calc.)	0.0272	0.0226
R(D974:14)	0.0400	0.0400



Determination of Air-release time at 50°C on sample #15055; results in min

lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432	ISO9120	2.0		0.39	
445		----		----	
446		----		----	
485		----		----	
494		----		----	
496	D3427	1.75		-0.02	
541		----		----	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657	D3427	1.41		-0.57	
704		----		----	
781		----		----	
862	D3427	1.2		-0.91	
875		----		----	
902		----		----	
922		----		----	
963	D3427	2.6		1.36	
974		----		----	
1011		----		----	
1026	D3427	1.6		-0.26	
1161		----		----	
1231		----		----	
1243	D3427	6.3	C,G(0.01)	7.37	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
1941		----		----	
1963		----		----	
1971		----		----	

normality unknown
n 6
outliers 1
mean (n) 1.76
st.dev. (n) 0.495
R(calc.) 1.39
R(D3427:12) 1.72

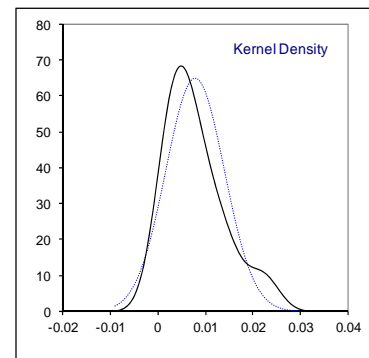
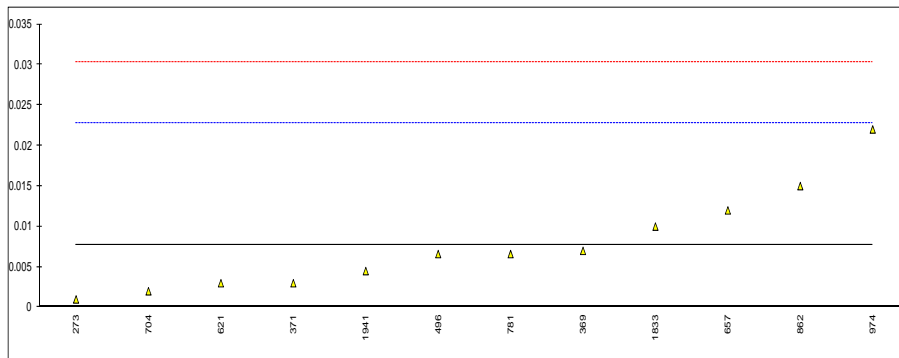


Determination of Color on sample #15055

lab	method	value	mark	z(targ)	remarks
237	D1500	L0.5		----	
273	D1500	L0.5		----	
311	D1500	L0.5		----	
315	D1500	L0.5		----	
323	D1500	L0.5		----	
337	D1500	L0.5		----	
340	D1500	L0.5		----	
357	D1500	L0.5		----	
369	D1500	L0.5		----	
371	D1500	L0.5		----	
396	D1500	L0.5		----	
432	D1500	L0.5		----	
445		----		----	
446	D1500	L0.5		----	
485	D1500	L0.5		----	
494	D1500	L0.5		----	
496	D1500	0.0		----	
541	D1500	L0.5		----	
551		----		----	
601	D1500	L0.5		----	
614	D1500	L0.5		----	
621	D1500	L0.5		----	
657	D1500	L0.5		----	
704	D1500	L0.5		----	
781	D1500	L0.5		----	
862	D1500	L0.5		----	
875	D1500	L0.5		----	
902	D1500	L0.5		----	
922	D1500	L0.5		----	
963	D1500	0.4		----	
974	D1500	L0.5		----	
1011	D1500	L0.5		----	
1026	D1500	L0.5		----	
1161	D6045	L0.5		----	
1231	D1500	L0.5		----	
1243	D1500	0.1		----	
1349	D1500	L0.5		----	
1461	ISO2049	0.5		----	
1682		----		----	
1748	D1500	0		----	
1833	D1500	L0.5		----	
1877	D6045	L0.5		----	
1941	ISO2049	L0.5		----	
1963		----		----	
1971		----		----	
	normality	n.a.			
	n	40			
	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 #15055; results in %M/M

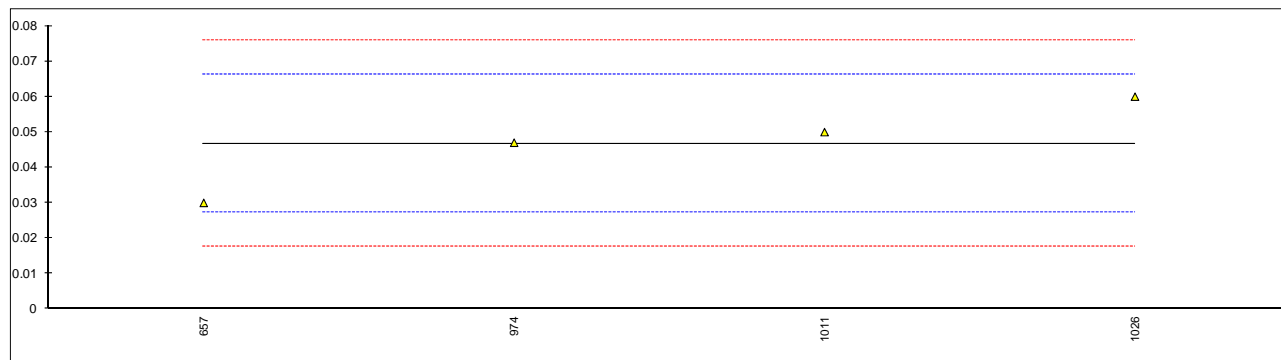
lab	method	value	mark	z(targ)	remarks
237		----		----	
273	D189	0.001		-0.90	
311		----		----	
315		----		----	
323	D4530	<0.10		----	
337		----		----	
340	D4530	<0.10		----	
357		----		----	
369	D4530	0.007		-0.10	
371	D189	0.003		-0.63	
396		----		----	
432		----		----	
445		----		----	
446		----		----	
485		----		----	
494	D4530	<0.01		----	
496	D4530	0.0066		-0.15	
541		----		----	
551		----		----	
601		----		----	
614		----		----	
621	D189	0.003		-0.63	
657	D4530	0.012		0.57	
704	D189	0.002		-0.76	
781	D4530	0.0066		-0.15	
862	D4530	0.015		0.97	
875		----		----	
902	D4530	<0.1		----	
922	D189	<0.01		----	
963		----		----	
974	D4530	0.022		1.90	
1011		----		----	
1026		----		----	
1161		----		----	
1231		----		----	
1243	D189	<0.01		----	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833	D4530	0.01		0.30	
1877		----		----	
1941	ISO10370	0.0045		-0.43	
1963		----		----	
1971		----		----	
normality		not OK			
n		12			
outliers		0			
mean (n)		0.0077			
st.dev. (n)		0.00615			
R(calc.)		0.0172			
R(D189:06)		0.0210			



Determination of Ramsbottom Carbon Residue on sample #15055; results in %M/M

lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
445		----		----	
446		----		----	
485		----		----	
494		----		----	
496		----		----	
541		----		----	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657	D524	0.03		-1.73	
704		----		----	
781		----		----	
862		----		----	
875		----		----	
902		----		----	
922		----		----	
963		----		----	
974	D524	0.047		0.03	
1011	D524	0.05		0.34	
1026	D524	0.06		1.37	
1161		----		----	
1231		----		----	
1243		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
1941		----		----	
1963		----		----	
1971		----		----	

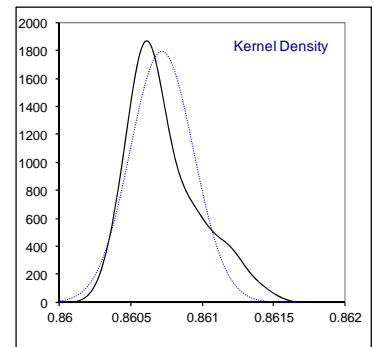
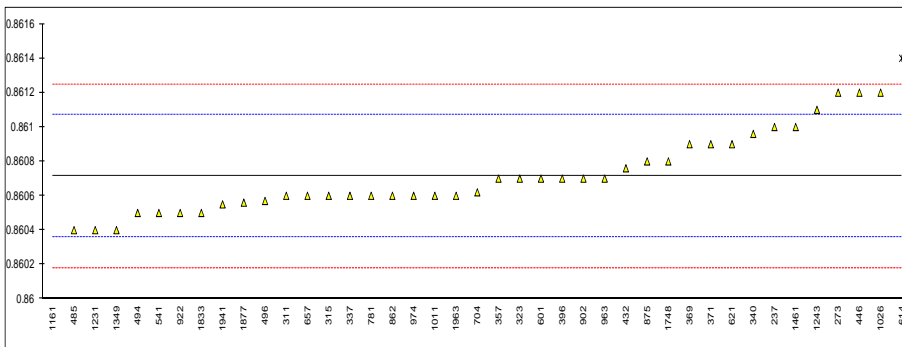
normality unknown
n 4
outliers 0
mean (n) 0.047
st.dev. (n) 0.0125
R(calc.) 0.035
R(D524:10) 0.027



Determination of Density at 15°C on sample #15055; results in kg/L

lab	method	value	mark	z(targ)	remarks
237	D4052	0.8610	C	1.61	first reported: 861.0
273	D4052	0.8612		2.73	
311	D4052	0.8606		-0.63	
315	D4052	0.8606		-0.63	
323	D4052	0.8607		-0.07	
337	ISO12185	0.8606		-0.63	
340	D4052	0.86096		1.38	
357	D4052	0.8607		-0.07	
369	D4052	0.8609		1.05	
371	D4052	0.8609		1.05	
396	D4052	0.8607		-0.07	
432	D4052	0.86076		0.26	
445		----		----	
446	D4052	0.8612		2.73	
485	D4052	0.8604		-1.75	
494	D4052	0.8605		-1.19	
496	D4052	0.86057		-0.80	
541	D4052	0.8605		-1.19	
551		----		----	
601	D1298	0.8607		-0.07	
614	D4052	0.8614	R(0.05)	3.85	
621	D4052	0.8609	C	1.05	probably unit error, reported: 860.9
657	D4052	0.8606		-0.63	
704	D4052	0.86062		-0.52	
781	D4052	0.8606		-0.63	
862	D4052	0.8606		-0.63	
875	D4052	0.8608		0.49	
902	D4052	0.8607		-0.07	
922	D4052	0.8605		-1.19	
963	D4052	0.8607		-0.07	
974	D4052	0.8606		-0.63	
1011	D4052	0.8606		-0.63	
1026	D4052	0.8612		2.73	
1161	ISO3675	0.8570	R(0.01)	-20.79	
1231	D4052	0.8604		-1.75	
1243	D4052	0.8611		2.17	
1349	IP365	0.8604		-1.75	
1461	ISO3675	0.8610	C	1.61	probably unit error, reported: 861.0
1682		----		----	
1748	D4052	0.8608		0.49	
1833	D4052	0.8605		-1.19	
1877	D4052	0.86056		-0.86	
1941	D4052	0.86055		-0.91	
1963	D4052	0.8606		-0.63	
1971		----		----	

normality OK
n 39
outliers 2
mean (n) 0.86071
st.dev. (n) 0.000222
R(calc.) 0.00062
R(D4052:11) 0.00050

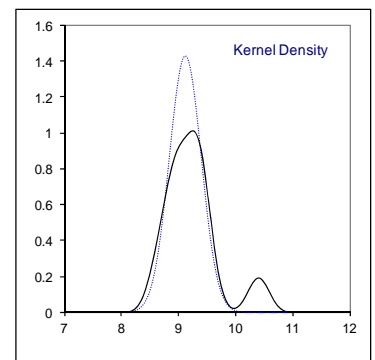
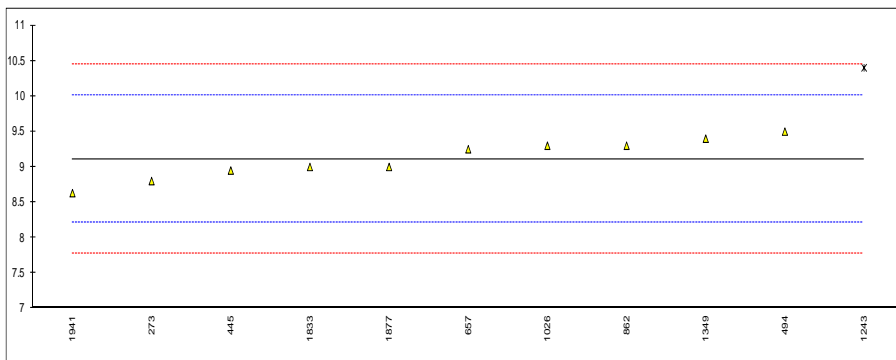


Determination of Evaporation loss by Noack test on sample #15055; results in %M/M

lab	method	value	mark	z(targ)	remarks
237		----		----	
273	D5800 - B	8.8		-0.70	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
445	D5800 - B	8.95		-0.37	
446		----		----	
485		----		----	
494	D5800 - B	9.5		0.87	
496		----		----	
541		----		----	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657	D5800 - B	9.25		0.31	
704		----		----	
781		----		----	
862	D5800 - B	9.3		0.42	
875		----		----	
902		----		----	
922		----		----	
963		----		----	
974		----		----	
1011		----		----	
1026	CEC L-40-93	9.3		0.42	
1161		----		----	
1231		----		----	
1243	D5800	10.40	G(0.05)	2.89	
1349	D5800 - B	9.4		0.64	
1461		----		----	
1682		----		----	
1748		----		----	
1833	D5800 - A	9.0		-0.25	
1877	D5800 - A	9.0		-0.25	
1941	D5800 - A	8.63		-1.08	
1963		----		----	
1971		----		----	

normality OK
n 10
outliers 1
mean (n) 9.113
st.dev. (n) 0.2797
R(calc.) 0.783
R(D5800:15-B) 1.249

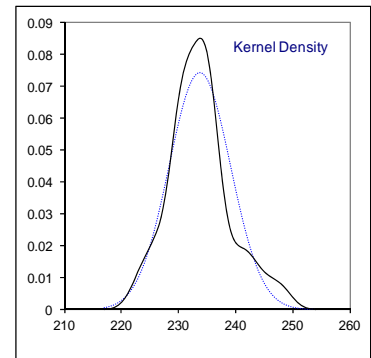
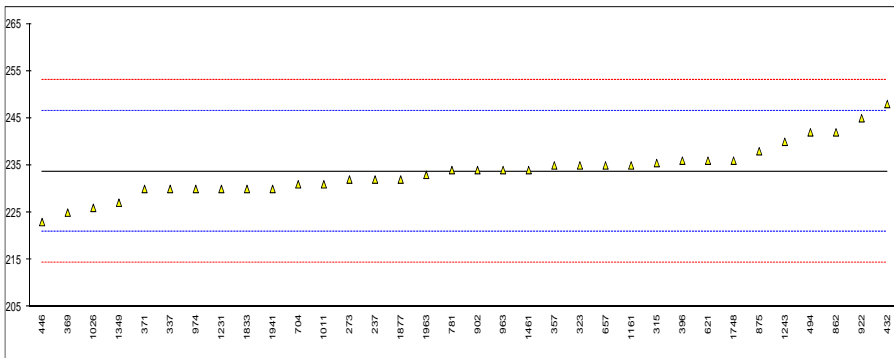
Compare R(D5800:15-A) = 1.668



Determination of Flash Point C.O.C. on sample #15055; results in °C

lab	method	value	mark	z(targ)	remarks
237	D92	232		-0.27	
273	D92	232		-0.27	
311		-----			
315	D92	235.505		0.28	
323	D92	235		0.20	
337	D92	230		-0.58	
340		-----			
357	D92	235		0.20	
369	D92	225		-1.36	
371	D92	230		-0.58	
396	D92	236		0.35	
432	D92	248		2.22	
445		-----			
446	D92	223		-1.67	
485		-----			
494	D92	242		1.29	
496		-----			
541		-----			
551		-----			
601		-----			
614		-----			
621	D92	236.0		0.35	
657	D92	235		0.20	
704	D92	231		-0.42	
781	D92	234		0.04	
862	D92	242		1.29	
875	D92	238		0.67	
902	D92	234.0		0.04	
922	D92	245.0		1.75	
963	D92	234		0.04	
974	D92	230		-0.58	
1011	D92	231		-0.42	
1026	D92	226		-1.20	
1161	ISO2592	235.0		0.20	
1231	D92	230		-0.58	
1243	D92	240		0.98	
1349	D92	227.1		-1.03	
1461	ISO2592	234		0.04	
1682		-----			
1748	D92	236		0.35	
1833	D92	230		-0.58	
1877	D92	232		-0.27	
1941	ISO2592	230		-0.58	
1963	D92	233		-0.11	
1971		-----			

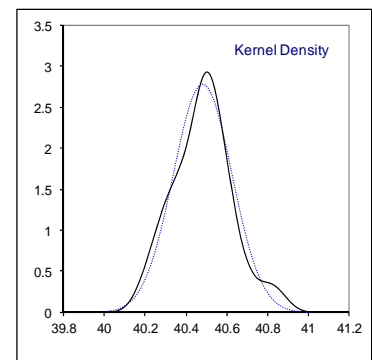
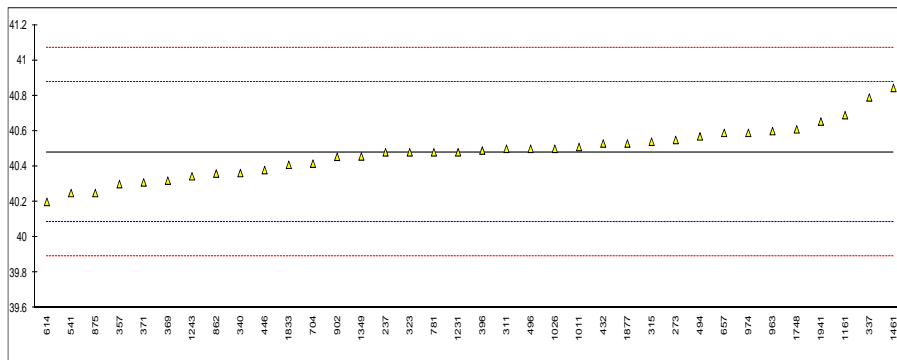
normality OK
n 34
outliers 0
mean (n) 233.72
st.dev. (n) 5.375
R(calc.) 15.05
R(D92:12b) 18.00



Determination of Kinematic Viscosity at 40°C on sample #15055; results in mm²/s

lab	method	value	mark	z(targ)	remarks
237	D445	40.48		-0.01	
273	D445	40.55		0.35	
311	D445	40.50		0.10	
315	D445	40.54		0.30	
323	D445	40.48		-0.01	
337	ISO3104	40.79		1.57	
340	D445	40.363		-0.60	
357	D445	40.30		-0.92	
369	D445	40.32		-0.82	
371	D445	40.31		-0.87	
396	D445	40.49		0.04	
432	D445	40.53		0.25	
445		----		----	
446	D445	40.38		-0.51	
485		----		----	
494	D445	40.57		0.45	
496	D445	40.500		0.10	
541	D445	40.25		-1.18	
551		----		----	
601		----		----	
614	D445	40.2	C	-1.43	first reported: 40
621		----		----	
657	D445	40.59		0.55	
704	D445	40.416		-0.33	
781	D445	40.48		-0.01	
862	D445	40.36		-0.62	
875	D445	40.25		-1.18	
902	D445	40.4547		-0.13	
922		----		----	
963	D445	40.60		0.60	
974	D445	40.59		0.55	
1011	D445	40.51		0.15	
1026	D445	40.50		0.10	
1161	D445	40.69		1.06	
1231	D445	40.48		-0.01	
1243	D445	40.345		-0.69	
1349	D445	40.4564		-0.13	
1461	ISO3104	40.8438		1.84	
1682		----		----	
1748	D445	40.61		0.66	
1833	D445	40.41		-0.36	
1877	D445	40.53		0.25	
1941	ISO3104	40.654		0.88	
1963		----		----	
1971		----		----	

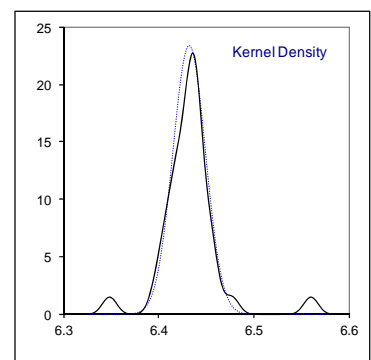
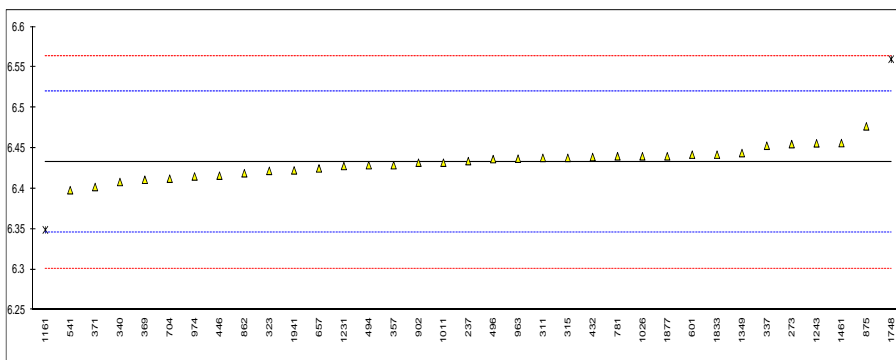
normality OK
n 36
outliers 0
mean (n) 40.481
st.dev. (n) 0.1434
R(calc.) 0.402
R(D445:15) 0.551



Determination of Kinematic Viscosity at 100°C on sample #15055; results in mm²/s

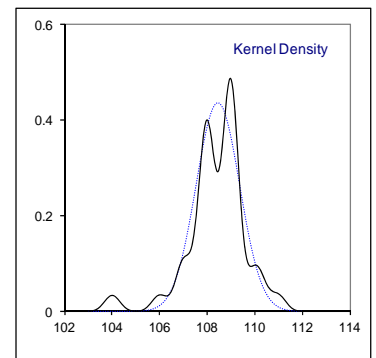
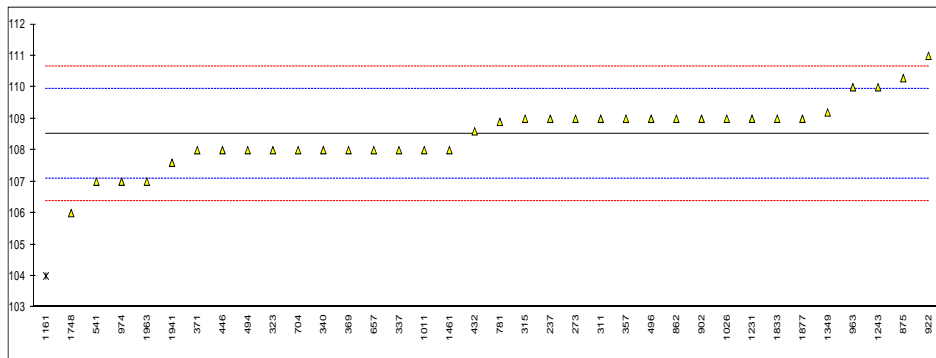
lab	method	value	mark	z(targ)	remarks
237	D445	6.434		0.04	
273	D445	6.455		0.52	
311	D445	6.438		0.13	
315	D445	6.438		0.13	
323	D445	6.422		-0.24	
337	ISO3104	6.453		0.47	
340	D445	6.4082		-0.55	
357	D445	6.429		-0.08	
369	D445	6.411		-0.49	
371	D445	6.402		-0.70	
396		----		----	
432	D445	6.439		0.15	
445		----		----	
446	D445	6.416		-0.38	
485		----		----	
494	D445	6.429		-0.08	
496	D445	6.4365		0.09	
541	D445	6.398		-0.79	
551		----		----	
601	D445	6.442		0.22	
614		----		----	
621		----		----	
657	D445	6.425		-0.17	
704	D445	6.4123		-0.46	
781	D445	6.440		0.17	
862	D445	6.419		-0.31	
875	D445	6.477		1.02	
902	D445	6.432		-0.01	
922		----		----	
963	D445	6.437		0.11	
974	D445	6.415		-0.40	
1011	D445	6.432		-0.01	
1026	D445	6.44		0.17	
1161	D445	6.349	R(0.01)	-1.91	
1231	D445	6.428		-0.10	
1243	D445	6.456		0.54	
1349	D445	6.4439		0.26	
1461	ISO3104	6.4563		0.55	
1682		----		----	
1748	D445	6.560	R(0.01)	2.92	
1833	D445	6.442		0.22	
1877	D445	6.440		0.17	
1941	ISO3104	6.4225		-0.23	
1963		----		----	
1971		----		----	

normality OK
n 33
outliers 2
mean (n) 6.4324
st.dev. (n) 0.01705
R(calc.) 0.0477
R(D445:15) 0.1222



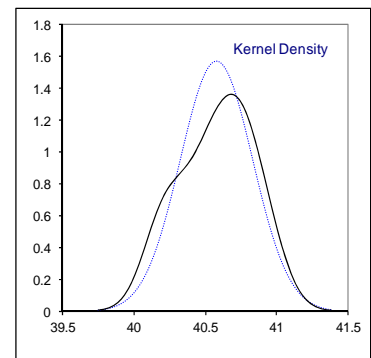
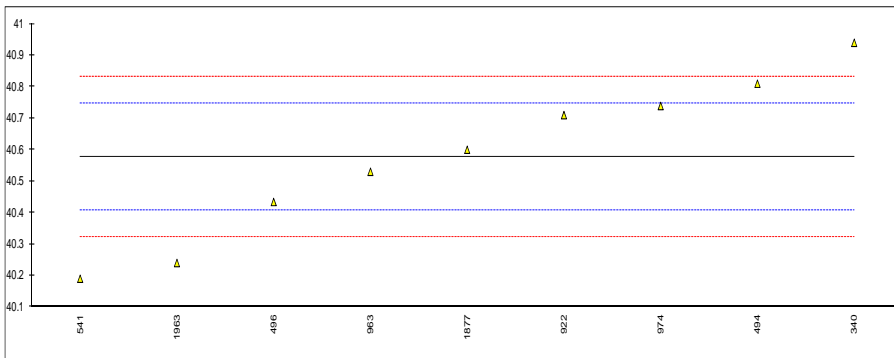
Determination of Viscosity index on sample #15055

lab	method	value	mark	z(targ)	calc.iis	mark	remarks
237	D2270	109		0.66	108.73		
273	D2270	109		0.66	109.35		
311	D2270	109		0.66	108.82		
315	D2270	109		0.66	108.64		
323	D2270	108		-0.74	108.19		
337	ISO2909	108		-0.74	108.18		
340	D2270	108		-0.74	108.11		
357	D2270	109		0.66	109.33		
369	D2270	108		-0.74	108.43		
371	D2270	108.0		-0.74	108.07		
396		----		----	----		
432	D2270	108.6		0.10	108.73		
445		----		----	----		
446	D2270	108		-0.74	108.38		
485		----		----	----		
494	D2270	108		-0.74	108.10		
496	D2270	109		0.66	108.75		
541	D2270	107		-2.14	108.16		
551		----		----	----		
601		----		----	----		
614		----		----	----		
621		----		----	----		
657	D2270	108		-0.74	107.83		
704	D2270	108.0		-0.74	108.05		
781	D2270	108.9		0.52	109.00		
862	D2270	109		0.66	108.61		
875	D2270	110.288		2.46	111.71	R(0.01)	E
902	D2270	109		0.66	108.76		
922	D2270	111		3.46	110.79		
963	D2270	110		2.06	108.32		E
974	D2270	107		-2.14	107.39		
1011	D2270	108		-0.74	108.51		
1026	D2270	109		0.66	108.91		
1161	D2270	104	R(0.01)	-6.34	103.99	R(0.01)	Outlier in viscosity at 100°C
1231	D2270	109		0.66	108.46		
1243	D2270	110		2.06	110.33		
1349	D2270	109.2		0.94	109.28		
1461	ISO2909	108		-0.74	108.08		
1682		----		----	----		
1748	D2270	106		-3.54	113.71	R(0.01)	E and outlier in viscosity at 100°C
1833	D2270	109		0.66	109.41		
1877	D2270	109		0.66	108.77		
1941	ISO2909	107.6		-1.30	107.43		
1963	D7042	107		-2.14	----		
1971		----		----	----		
normality		OK			OK		
n		35			32		
outliers		1			3		
mean (n)		108.53			108.62		
st.dev. (n)		1.002			0.716		
R(calc.)		2.81			2.00		
R(D2270:10e1)		2.00			2.00		



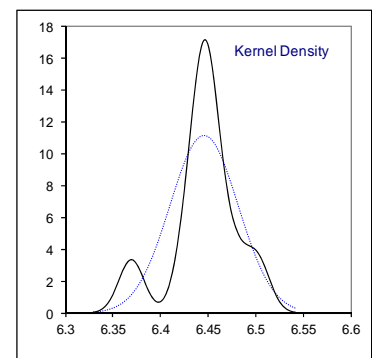
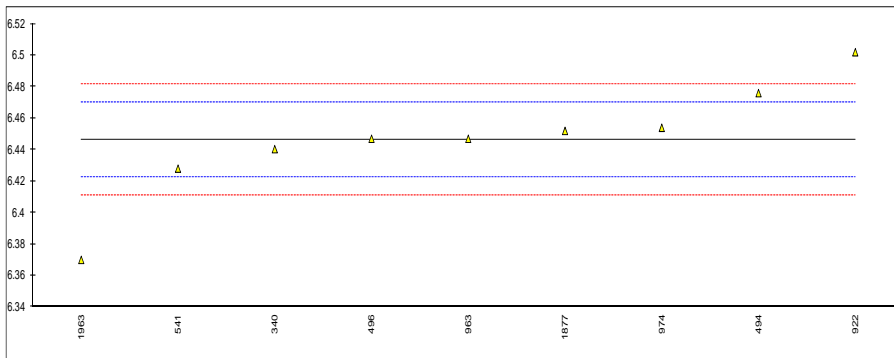
Determination of Viscosity Stabinger at 40 °C on sample #15055; results in mm²/s

lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340	D7042	40.940		4.29	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
445		----		----	
446		----		----	
485		----		----	
494	D7042	40.81		2.75	
496	D7042	40.434		-1.69	
541	D7042	40.19		-4.57	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657		----		----	
704		----		----	
781		----		----	
862		----		----	
875		----		----	
902		----		----	
922	D7042	40.71		1.57	
963	D7042	40.53		-0.56	
974	D7042	40.739		1.91	
1011		----		----	
1026		----		----	
1161		----		----	
1231		----		----	
1243		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833		----		----	
1877	D7042	40.60		0.27	
1941		----		----	
1963	D7042	40.24		-3.98	
1971		----		----	
normality		OK			
n		9			
outliers		0			
mean (n)		40.577			
st.dev. (n)		0.2541			
R(calc.)		0.711			
R(D7042:14)		0.237			



Determination of Viscosity Stabinger at 100 °C on sample #15055; results in mm²/s

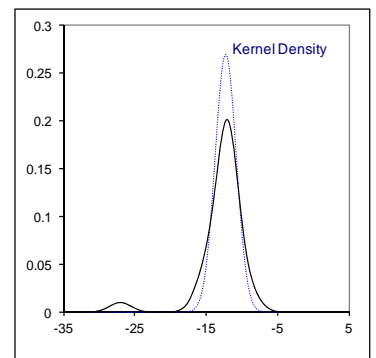
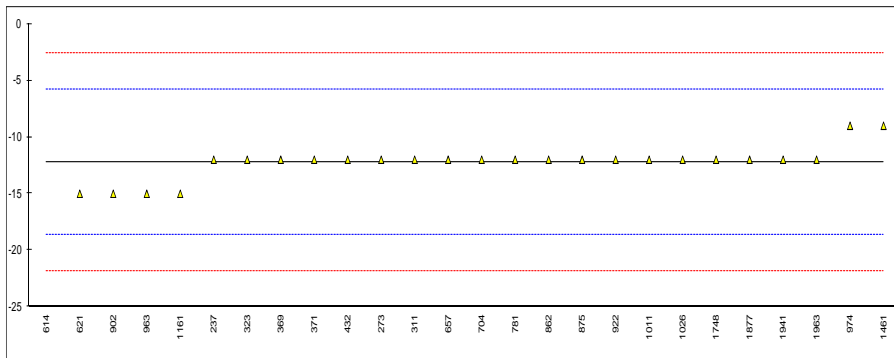
lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340	D7042	6.4404		-0.50	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
445		----		----	
446		----		----	
485		----		----	
494	D7042	6.476		2.52	
496	D7042	6.447		0.06	
541	D7042	6.428		-1.55	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657		----		----	
704		----		----	
781		----		----	
862		----		----	
875		----		----	
902		----		----	
922	D7042	6.502		4.72	
963	D7042	6.447		0.06	
974	D7042	6.454		0.65	
1011		----		----	
1026		----		----	
1161		----		----	
1231		----		----	
1243		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833		----		----	
1877	D7042	6.452		0.49	
1941		----		----	
1963	D7042	6.370		-6.46	
1971		----		----	
normality		not OK			
n		9			
outliers		0			
mean (n)		6.4463			
st.dev. (n)		0.03583			
R(calc.)		0.1003			
R(D7042:14)		0.0331			



Determination of Pour Point manual on sample #15055; results in °C

lab	method	value	mark	z(targ)	remarks
237	D97	-12		0.07	
273	D97	-12		0.07	
311	D97	-12		0.07	
315		----		----	
323	D97	-12		0.07	
337		----		----	
340		----		----	
357		----		----	
369	D97	-12		0.07	
371	D97	-12		0.07	
396		----		----	
432	D97	-12		0.07	
445		----		----	
446		----		----	
485		----		----	
494		----		----	
496		----		----	
541		----		----	
551		----		----	
601		----		----	
614	D97	-27	C,R(0.01)	-4.59	first reported: -24
621	D97	-15.0		-0.86	
657	D97	-12		0.07	
704	D97	-12		0.07	
781	D97	-12		0.07	
862	D97	-12		0.07	
875	D97	-12		0.07	
902	D97	-15		-0.86	
922	D97	-12.0		0.07	
963	D97	-15		-0.86	
974	D97	-9		1.01	
1011	D97	-12		0.07	
1026	D97	-12		0.07	
1161	D97	-15		-0.86	
1231		----		----	
1243		----		----	
1349		----		----	
1461	ISO3016	-9		1.01	
1682		----		----	
1748	D97	-12		0.07	
1833		----		----	
1877	D97	-12		0.07	
1941	ISO3016	-12		0.07	
1963	D97	-12		0.07	
1971		----		----	

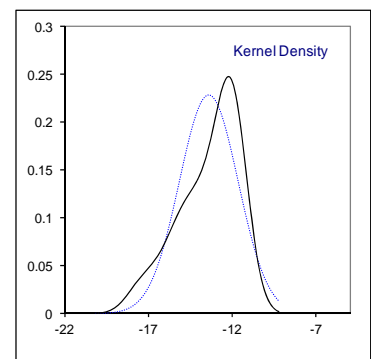
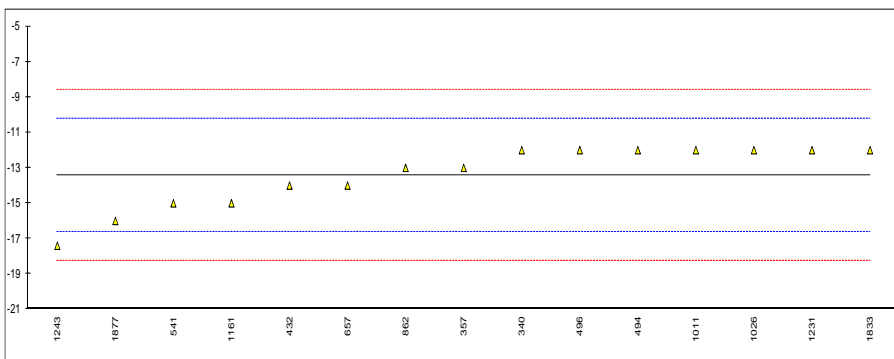
normality suspect
n 25
outliers 1
mean (n) -12.24
st.dev. (n) 1.480
R(calc.) 4.14
R(D97:12) 9.00



Determination of Pour Point automated on sample #15055; results in °C

lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315		----		----	
323		----		----	
337		----		----	
340	D5950	-12		0.89	
357	D5950	-13		0.27	
369		----		----	
371		----		----	
396		----		----	
432	D5950	-14		-0.36	
445		----		----	
446		----		----	
485		----		----	
494	D5950	-12		0.89	
496	D5950	-12		0.89	
541	D5950	-15		-0.98	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657	D5950	-14		-0.36	
704		----		----	
781		----		----	
862	D5950	-13		0.27	
875		----		----	
902		----		----	
922		----		----	
963		----		----	
974		----		----	
1011		-12		0.89	
1026	D5950	-12		0.89	
1161	D6749	-15		-0.98	
1231	D5950	-12		0.89	
1243	D5950	-17.4		-2.47	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833	D5950	-12		0.89	
1877	D5950	-16		-1.60	
1941		----		----	
1963		----		----	
1971		----		----	

normality OK
n 15
outliers 0
mean (n) -13.43
st.dev. (n) 1.745
R(calc.) 4.89
R(D5950:14) 4.50



Determination of Rust prevention (proc.B) on sample #15055

lab	method	value	mark	z(targ)	remarks
237		----		----	
273		----		----	
311		----		----	
315	D665	Fails		----	
323		----		----	
337		----		----	
340		----		----	
357		----		----	
369		----		----	
371		----		----	
396		----		----	
432		----		----	
445	D665	Fail severe		----	
446		----		----	
485		----		----	
494		----		----	
496	D665	Fail (severe rusting)		----	
541		----		----	
551		----		----	
601		----		----	
614		----		----	
621		----		----	
657		----		----	
704		----		----	
781		----		----	
862	D665	Severe rusting		----	
875		----		----	
902		----		----	
922		----		----	
963	D665	Pass		----	False negative?
974		----		----	
1011		----		----	
1026	D665	Fail severe		----	
1161		----		----	
1231		----		----	
1243		----		----	
1349		----		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833		----		----	
1877		----		----	
1941		----		----	
1963		----		----	
1971		----		----	
	reported	5 fail, 1 pass			

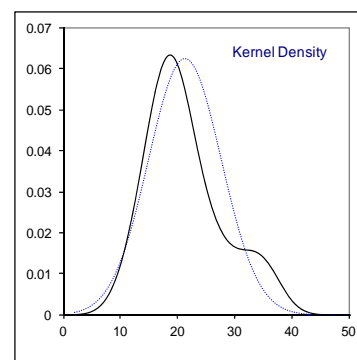
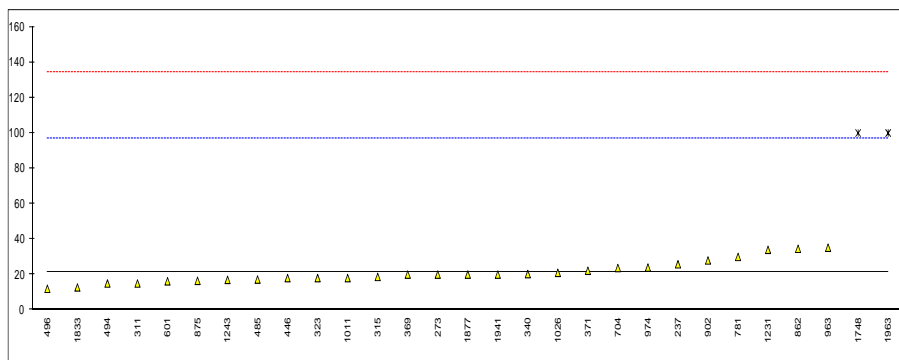
Determination of Sulphur on sample #15055; results in mg/kg

lab	method	value	mark	z(targ)	remarks
237	D4294	<20.0		----	
273		----		----	
311	D2622	<3		----	
315		----		----	
323	D2622	<3		----	
337		----		----	
340	D5453	<0.5		----	
357		----		----	
369		----		----	
371	D5453	0.21		----	
396		----		----	
432		----		----	
445		----		----	
446		----		----	
485		----		----	
494	ISO20846	0.3		----	
496	D2622	0.0		----	
541	D5453	<10		----	
551		----		----	
601		----		----	
614		----		----	
621	D4294	<20		----	
657	D5453	0.3	C	----	first reported: 0.3 %M/M
704	ISO20846	0.73		----	
781	D5453	<1.0		----	
862	D2622	<3		----	
875	D2622	0.7		----	
902		----		----	
922	D4294	<17.0		----	
963		----		----	
974		----		----	
1011		<60		----	
1026	D2622	<3		----	
1161	ISO8754	2203		----	False positive result? Possibly a unit error?
1231		----		----	
1243		----		----	
1349	D7039	0.0		----	
1461		----		----	
1682		----		----	
1748		----		----	
1833	D5453	0.987		----	
1877		----		----	
1941		----		----	
1963		----		----	
1971		----		----	
	normality	OK			
	n	14			
	outliers	n.a.			
	mean (n)	<3			
	st.dev. (n)	n.a.			
	R(calc.)	n.a.			
	R(D2622:10)	n.a.			Application range: 3 mg/kg – 4.6 %M/M

Determination of Water on sample #15055; results in mg/kg

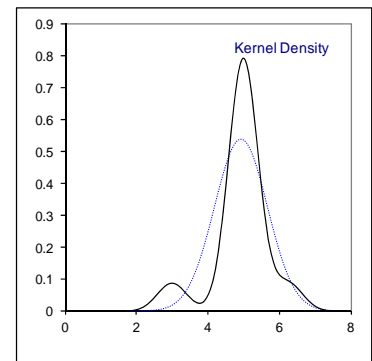
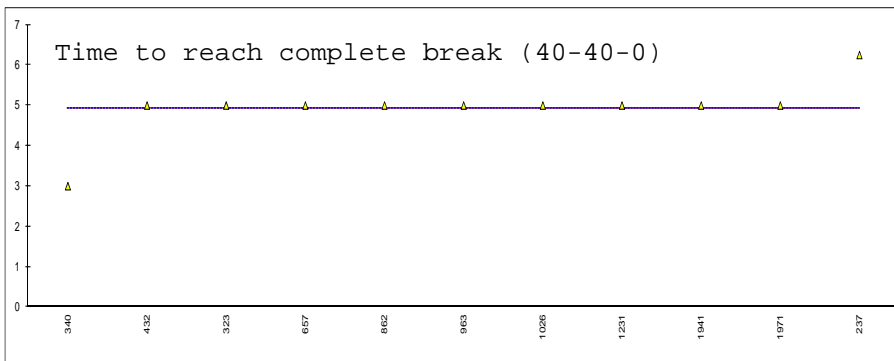
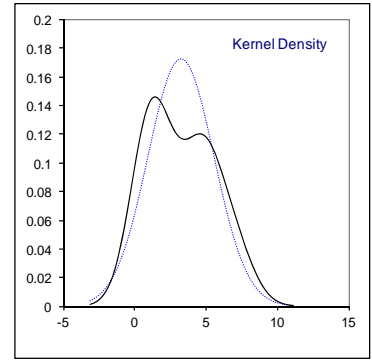
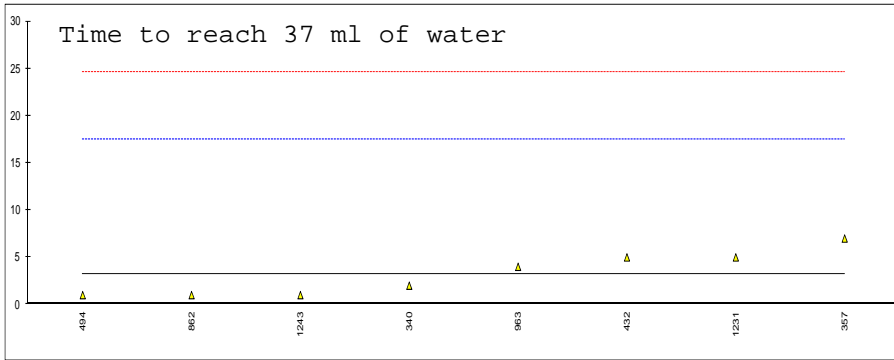
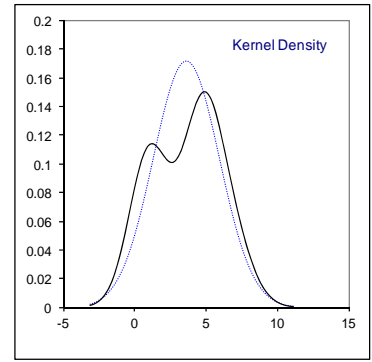
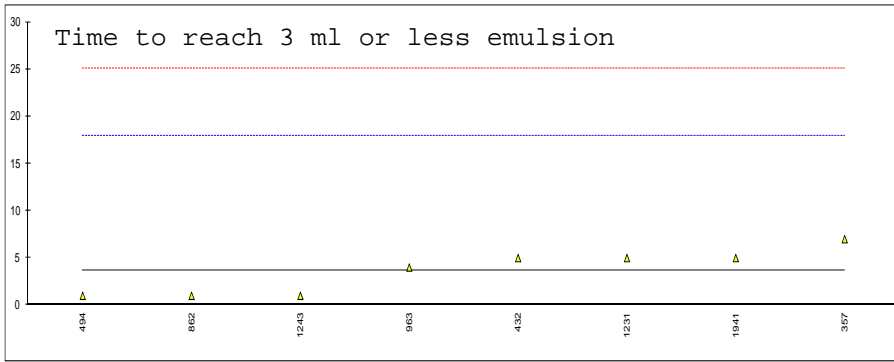
lab	method	value	mark	z(targ)	remarks
237	D6304	25.84		0.12	
273	D6304	20.0		-0.03	
311	D6304-A	15		-0.17	
315	D6304-C	18.7		-0.07	
323	D6304-A	18		-0.09	
337		----		----	
340	D6304-A	20.3		-0.02	
357		----		----	
369	D6304-A	20		-0.03	
371	D6304	22.16		0.02	
396		----		----	
432		----		----	
445		----		----	
446	D6304-A	18		-0.09	
485	D6304-A	17.2		-0.11	
494	D6304-B	15		-0.17	
496	D6304-C	12		-0.24	
541		----		----	
551		----		----	
601	D6304	16.2		-0.13	
614		----		----	
621		----		----	
657		----		----	
704	D6304	23.7		0.07	
781	D6304-A	30		0.23	
862	D6304-C	34.6		0.35	
875	D6304-A	16.507		-0.13	
902	D6304-A	28		0.18	
922	D6304	<10.0		----	
963	D6304-A	35.2		0.37	
974	D6304-A	24		0.07	
1011	D6304-A	18		-0.09	
1026	D6304-C	21		-0.01	
1161		----		----	
1231	D6304-A	34		0.34	
1243	D6304	17		-0.11	
1349		----		----	
1461		----		----	
1682		----		----	
1748	D1744	100	R(0.01)	2.09	
1833	D6304-A	12.7421		-0.22	
1877	D6304-C	20		-0.03	
1941	D6304	20		-0.03	
1963	D6304-C	100	R(0.01)	2.09	
1971		----		----	

normality OK
n 27
outliers 2
mean (n) 21.23
st.dev. (n) 6.376
R(calc.) 17.85
R(D6304:07) 105.64



Determination of Water Separability at 54°C on sample #15055; results in minutes

lab	method	time to reach 3 ml or less emulsion	z(targ)	time to reach 37 ml of water	z(targ)	time to reach complete break (40-40-0)	z(targ)	time test aborted
237		----	----	----	----	6.25	----	----
273		----	----	----	----	----	----	----
311		----	----	----	----	----	----	----
315		----	----	----	----	----	----	----
323		----	----	----	----	5	----	NO
337		----	----	----	----	----	----	----
340		----	----	2	-0.18	3	----	----
357	D1401	7	0.47	7	0.53	----	----	YES
369		----	----	----	----	----	----	----
371		----	----	----	----	----	----	----
396		----	----	----	----	----	----	----
432	D1401	5	0.19	5	0.25	5	----	NO
445	D1401	<5	----	<5	----	<5	----	NO
446		----	----	----	----	----	----	----
485		----	----	----	----	----	----	----
494	D1401	1	-0.37	1	-0.32	<5	----	NO
496		----	----	----	----	----	----	----
541		----	----	----	----	----	----	----
551		----	----	----	----	----	----	----
601		----	----	----	----	----	----	----
614		----	----	----	----	----	----	----
621		----	----	----	----	----	----	----
657	D1401	<5	----	<5	----	5	----	NO
704		----	----	----	----	----	----	----
781		----	----	----	----	----	----	----
862	D1401	1	-0.37	1	-0.32	5	----	----
875		----	----	----	----	----	----	----
902		----	----	----	----	----	----	----
922		----	----	----	----	----	----	----
963	D1401	4.0	0.05	4.0	0.11	5	----	NO
974		----	----	----	----	----	----	----
1011		----	----	----	----	----	----	----
1026		----	----	----	----	5	----	----
1161		----	----	----	----	----	----	----
1231	D1401	5	0.19	5	0.25	5	----	NO
1243	D1401	1.0	-0.37	1.0	-0.32	----	----	----
1349		----	----	----	----	----	----	----
1461		----	----	----	----	----	----	----
1682		----	----	----	----	----	----	----
1748		----	----	----	----	<5	----	----
1833		----	----	----	----	----	----	----
1877		----	----	----	----	----	----	----
1941	D1401	5	0.19	<5	----	5	----	YES
1963		----	----	----	----	----	----	----
1971		----	----	----	----	5	----	----
normality		unknown		unknown				
n		8		8				
outliers		0		0				
mean (n)		3.63		3.25				
st.dev. (n)		2.326		2.315				
R(calc.)		6.51		6.48				
R(D1401:12)		20.00		20.00				



Determination of Water Separability at 54°C sample #15055; results in ml

lab	method	volume oil phase	volume water phase	volume emulsion phase	reported
237		----	----	----	
273		----	----	----	
311		----	----	----	
315		----	----	----	
323		40	40	0	
337		----	----	----	
340		40.0	40.0	0.0	
357	D1401	40	39	1	
369		----	----	----	
371		----	----	----	
396		----	----	----	
432	D1401	40	40	0	
445	D1401	40	40	0	
446		----	----	----	
485		----	----	----	
494	D1401	40	40	0	
496		----	----	----	
541		----	----	----	
551		----	----	----	
601		----	----	----	
614		----	----	----	
621		----	----	----	
657	D1401	----	----	----	
704		----	----	----	
781		----	----	----	
862	D1401	40	40	0	40-40-0 (5 min)
875		----	----	----	
902		----	----	----	
922		----	----	----	
963	D1401	40	40	0	
974		----	----	----	
1011		----	----	----	
1026		----	----	----	
1161		----	----	----	
1231	D1401	40	40	0	
1243	D1401	----	----	----	
1349		----	----	----	
1461		----	----	----	
1682		----	----	----	
1748		----	----	----	
1833		----	----	----	
1877		----	----	----	
1941	D1401	40	40	0	
1963		----	----	----	
1971		----	----	----	

APPENDIX 2

Number of participants per country

1 lab in ALGERIA
1 lab in ARGENTINA
1 lab in AUSTRALIA
1 lab in AUSTRIA
2 labs in BELGIUM
1 lab in BRAZIL
1 lab in BULGARIA
1 lab in CHINA, People's Republic
1 lab in CROATIA
1 lab in FINLAND
2 labs in FRANCE
3 labs in GERMANY
1 lab in INDONESIA
1 lab in ITALY
1 lab in JORDAN
2 labs in LATVIA
1 lab in MALAYSIA
3 labs in NETHERLANDS
1 lab in NIGERIA
1 lab in PAKISTAN
2 labs in POLAND
1 lab in PORTUGAL
2 labs in RUSSIAN FEDERATION
1 lab in SAUDI ARABIA
1 lab in SERBIA
1 lab in SINGAPORE
1 lab in SOUTH AFRICA
1 lab in THAILAND
3 labs in TURKEY
1 lab in UKRAINE
1 lab in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM

APPENDIX 3

Abbreviations:

C	= final result after checking of first reported suspect 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 outlier test
R(0.05)	= straggler in Rosner outlier test
ex	= excluded from calculations
U	= reported in different unit
W	= result withdrawn on request of the participants
fr.	= first reported
S	= scope of the reported method is not applicable
n.a.	= not applicable
n.e.	= not evaluated
SDS	= Material Safety Data Sheet

Literature:

- 1 iis Interlaboratory Studies, Protocol for the Organization, Statistics and Evaluation, April 2014
- 2 ASTM E178:08
- 3 ISO 5725-86
- 4 ISO 5725, parts 1-6, 1994
- 5 ISO13528:05
- 6 ISO17043:2010
- 7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
- 8 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
- 9 IP 367/84
- 10 DIN 38402 T41/42
- 11 P.L. Davies, First reported Z. Anal. Chem, 331, 513, (1988)
- 12 J.N. Miller, Analyst, 118, 455, (1993)
- 13 Analytical Methods Committee Technical brief, No4 January 2001.
- 14 The Royal Society of Chemistry 2002, Analyst 2002, 127 pages 1359-1364, P.J. Lowthian and M. Thompson (see <http://www.rsc.org/suppdata/an/b2/b205600n/>).
- 15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, *Technometrics*, 25(2), pp. 165-172, (1983)