Results of Proficiency Test Gasoil March 2010

CONTENTS

1   INTRODUCTION

Since 1994, the institute for Interlaboratory Studies organizes proficiency tests for Gasoil. In the annual proficiency testing program of 2009-2010, it was decided to continue this PT. In this international interlaboratory study of the annual program, 75 laboratories from 34 different countries have participated. See appendix 3 for a list of participants in alphabetical country order. In this report the results of the Gasoil proficiency test are presented and discussed.

2   SET UP

The Institute for Interlaboratory Studies (i.i.s.) in Spijkenisse, the Netherlands, was the organiser of this proficiency test. Sample analyses for fit-for-use and homogeneity testing were subcontracted. In the regular Gasoil round robin, it was decided to send two identical samples of Gasoil (1*1 L and 1* 500 mL low sulphur Gasoil (both labelled #1011)). For the PT Total Contamination in Gasoil, it was decided to send one sample of 1 L (#1012).
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 guide 43 and ILAC-G13:2007, (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This ensures 100% confidentially 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 January 2010 (iis-protocol, version 3.2), which can be downloaded from www.iisnl.com.

2.3 CONFIDENTIALITY STATEMENT

All data present 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 200 litre low sulphur Gasoil (automotive diesel) was purchased from the local market. After homogenization, the material was subsequently divided over 120 amber glass bottles of 1L and 120 amber glass bottles of 500 mL with inner and outer caps and both labelled #1011. The homogeneity of the 1L and 500 mL subsamples were checked by the determination of Density in accordance with ASTM D4052:09 on 12 stratified random selected samples.

	Density @ 15 °C in kg/m^3
sample #1012-1	833.71
sample #1012-2	833.72
sample #1012-3	833.71
sample #1012-4	833.72
sample #1012-5	833.72
sample #1011-6	833.72
sample #1011-7	833.71
sample #1011-8	833.71
sample #1011-9	833.72
sample #1011-10	833.71
sample #1011-11	833.72
sample #1011-12	833.72

table 1: homogeneity test of subsamples #1011

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 @ 15ºC in kg/m^3
r (sample #1011)	0.01
reference test	ASTM D4052:09
0.3*R (reference test)	0.15

Table 2: precision data of the subsamples #1011

The calculated repeatability was less than 0.3 times the reproducibility of the reference method. Therefore, homogeneity of the subsamples #1011 was assumed.

For Total Contamination another 50 litre Gasoil (automotive diesel) was purchased from the local market. After homogenization, the material was subsequently divided over 43 amber glass bottles of 1L with inner and outer caps and labelled #1012. Each sample was spiked with 1 ml of a fresh prepared and well shaken, 20 g/kg particulate quartz material BCR-067 (ø 2.4-32 µm) in oil suspension.

The homogeneity was checked by weighting the bottles before and after addition of the spike.

Depending on the registration, two bottles of regular Gasoil (1*1 L and 1*500 mL both labelled #1011) and/or 1 bottle of Gasoil for Total Contamination (1*1 L labelled #1012) were sent to the participating laboratories on February 10, 2010.

2.5 STABILITY OF THE SAMPLES

The stability of the gasoil, packed in the amber glass bottles, was checked. The material was found sufficiently stable for the period of the proficiency test.

2.6 ANALYSIS

The participants were asked to determine on the samples #1011: Ash Content, Cetane Index, Conradson Carbon Residue on 10% residue, Cloud Point, Cold Filter Plugging Point (CFPP), Density @ 15°C, Distillation (IBP, 5%, 10%, 50%, 90% recovered, FBP and %V/V at 250ºC and 350ºC), FAME content, Flash Point PMcc, Kinematic Viscosity @ 40°C, Lubricity by HFRR, Mono-, Di-, Tri+, Poly- and Total Aromatics, Sulphur content and Water. On sample #1012 was requested to determine Total Contamination only. The participants were also requested to report additional information for some determinations.

To get comparable results a detailed report form, on which the units were prescribed as well as some of the required standards, was sent together with each set of samples. In addition, a letter of instructions and a SDS were added to the 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 1 of this report. The laboratories are presented by their code numbers.

Directly after deadline, a reminder fax was sent to those laboratories that had not yet reported.

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 (raw data of the) reported results. Additional or corrected results have been used for data analysis and the 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' of January 2010 (iis-protocol, version 3.2).

For the 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. After removal of outliers, this check was repeated. Not all data sets proved to have a normal distribution, in which cases the conclusions of statistical evaluation should be used with due care.

In accordance with ISO 5725 (1986 and 1994) the original results per determination were submitted subsequently to Dixon and Grubbs outlier tests.

Outliers are marked by D(0.01) for the Dixon test, by G(0.01) or DG(0.01) for the Grubbs test. Stragglers are marked by D(0.05) for the Dixon test, by G(0.05) or DG(0.05) for the Grubbs test. Both outliers and stragglers were not included in the calculations of averages and standard deviations.

Finally, the reproduciblities 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 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. This is a method for producing a smooth density approximation to a set of data that avoids some problems associated with histograms (see appendix 4; nr.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 results in an evaluation independent of the spread of this interlaboratory study. The target standard deviation was calculated from the literature reproducibility by division with 2.8. The z-scores were calculated according to:

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

The $z_{(target)}$ scores are listed in the result tables in appendix 1.
Absolute values for z<2 are very common and absolute values for z>3 are very rare.
Therefore, the usual interpretation of z-scores is as follows:

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

4   EVALUATION

In this interlaboratory study, some problems with customs clearance were encountered during dispatch of the samples to Sudan.
Fifteen participants reported results after the final reporting date and three participants did not report any results. Finally, 72 participants reported 1322 numerical results in total. Observed were 58 outlying results, which is 4.4%. In proficiency studies, outlier percentages of 3%-7.5% are quite normal.

Not all original data sets proved to have a normal distribution. Anormal distributions were found in: Cetane Index (D4737), Cloud Point, CFPP, Colour, Density, Flash Point, Kinematic Viscosity, Lubricity, Pour Point and Distillation (automated Vol at 250ºC and 350ºC). Therefore, the statistical evaluation for these determinations should be used with care.

4.1   EVALUATION PER TEST

In this section, the results are discussed per test.

Aromatics: This determination was problematic. In total fifteen statistical outliers were observed and none of the calculated reproducibilities, after rejection of the statistical outliers, is in agreement with the requirements of IP391:07/EN12916.

Ash: Regretfully, the ash content for this sample was below or near the application range of the method (0.001 – 0.180 %M/M). Therefore no significant conclusions were drawn.

C.I. D976:   Regretfully, no reproducibility limits are mentioned in ASTM D976:06. The calculated reproducibility is small in comparison with the findings of the previous i.i.s. proficiency test (see also iis09G02).

C.I. D4737:   This determination was very problematic. The data show a bimodal distribution. In this case, it appeared that not all participants used the same calculation method. Thirty-three participants reported results according procedure A of ISO4264:95/IP380:98/ASTM D4737 and nine participants reported results according ASTM D4737 procedure B.
                Upto 2003 ISO4264 and ASTM D4737 were similar test methods. However since 2003 only in ASTM D4737 two possible calculation methods for Cetane Index are given. The actual calculation method to be used depends on the type of Gasoil that is specified in table 1 of ASTM D975:09. This makes it rather confusing because the latest version of ISO4264 is said to be similar to ASTM D4737:96a(01) and in this version only calculation A is described.

Cloud Point: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of ASTM D2500:09/ISO3015.

CFPP: This determination was problematic for one laboratory. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in good agreement with the requirements of IP309:99/EN116.

Colour ASTM: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D1500:07.

Conradson Carbon Residue: This determination was problematic for four laboratories at this low level of carbon residue. Four statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is in agreement with ASTM D189:06e2.
According to the appendix in ASTM D4530 or (ISO10370), the test results of ASTM D4530 are equivalent to the test results of ASTM D189 (or ISO6615), but the precision of the micro method is better.

Copper Corrosion: This determination was not problematic. All participants agreed on a result of 1 (or 1A).

Density @15°C: This determination was problematic for one laboratory. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in good agreement with ASTM D4052:09.

FAME: This determination was problematic for one laboratory. No statistical outliers were observed, one participant reported a false negative result and was excluded from the statistical evaluation. The calculated reproducibility, after rejection of the false negative result, is in full agreement with EN14078:03. However, when compared against the new method EN14078:2009, the determination would be very problematic because the observed reproducibility is not at all in agreement with the strict reproducibility limits of the new version of the standard. Probably not many participating laboratories did use this latest version of EN14078.

Flash Point: This determination was not problematic. Only three statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is in good agreement with the requirements of ASTM D93:08. When the results are evaluated separately for manual and automatic mode and flame and electric ignition, all calculated reproducibilities are in agreement with the requirements of ASTM D93:08. The calculated reproducibility for automatic mode with flame ignition is the smallest.

Kin. visc. 40°C: This determination was very problematic. Only two statistical outliers were observed. However, the calculated reproducibility, after rejection of the statistical outliers, is not in agreement with ASTM D445:09.

Lubricity: This determination was problematic for one laboratory. Only one statistical outlier was observed. The calculated reproducibility, after rejection of the statistical outlier, is in full agreement with ISO12156:97.

Nitrogen: This determination was very problematic. Two statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is not at all in agreement with ASTM D4629:09.

Pour Point manual: This determination was not problematic. Only two statistical outliers were observed. The calculated reproducibility is, after rejection of the statistical outliers, in good agreement with ASTM D97:09.

Pour Point automated: This determination was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with ASTM D5950:07. It is noticed that the consensus value found for upper PP is equal to the consensus value found for PP automated, as was expected.

Sulphur: This determination was problematic for several laboratories. Three statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is in agreement with the requirements of ASTM D5453:09.

Total Acid Number: This determination was not problematic. No statistical outliers were observed. One reported result was exluded for statistical evaluation. The calculated reproducibility is in good agreement with the requirements of ASTM D974:08.

Water: This determination was not problematic. Three statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is in good agreement with the ASTM D6304:07, although several different methods were used.

Distillation: The automated method was only problematic for Initial Boiling Point. In total twelve statistical outliers were observed. All calculated reproducibilities, except for IBP, are, after rejection of the statistical outliers, in good agreement with the requirements of ASTM D86:09e1.
The manual method is problematic for Initial and Final Boiling Point. In total three statistical outliers were observed. All the calculated reproducibilities, except for IBP and FBP, were, after rejection of the statistical outliers, in agreement with the requirements of ASTM D86:09.

Total Contamination: Serious analytical problems have been observed. The samples were spiked with 1 ml of a fresh prepared and well shaken, 20 g/kg particulate quartz material BCR-067 (ø 2.4-32 µm) in oil suspention, therefore the minimal Total Contamination concentration to be found was known (added amount = 20.8 mg/kg). The laboratories should be able to find at least 14.6 mg/kg [20.8 mg/kg$_{(added\ amount)}$ – 6.2 mg/kg$_{(R\ EN12662)}$].

However, 7 of 24 laboratories reported lower amounts than 14.6 mg/kg and were rejected prior to data analysis. The reason for the low TC concentrations found is possibly insufficient homogenisation of the sample by the respective laboratory prior to sub sampling for analysis.

After excluding of the suspicious data the calculated reproducibility is not at all in agreement with the requirements of EN12662:08. The average recovery (consensus value / spiked amount) is satisfactory (<112%)

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 of the evaluated parameters, calculated reproducibilities and reproducibilities, derived from literature standards (in casu ASTM standards) are compared in the next tables.

Parameters	unit	n	average	2.8 * sd	R (lit)
Aromatics, mono-	%M/M	28	21.07	3.22	2.69
Aromatics, di-	%M/M	26	2.45	0.92	0.80
Aromatics, tri+	%M/M	24	0.33	0.69	0.62
Aromatics, poly-	%M/M	27	2.76	1.24	0.98
Aromatics, total-	%M/M	26	24.07	3.44	3.05
Ash content	%M/M	26	0.00089	0.00159	(0.00500)
Cetane Index ASTM D976		18	54.036	0.486	Unknown
Cetane Index ASTM D4737-A		33	54.798	0.844	Unknown
Cetane index ASTM D4737-B		9	52.744	1.243	Unknown
Cloud Point	°C	47	-7.24	2.66	4.00
Cold Filter Plugging Point	°C	52	-15.86	3.40	4.21
Colour ASTM		22	1.00	0.54	1.00
Conradson Carbon Residue	%M/M	28	0.0199	0.0269	0.0283
Copper Corrosion 3hrs@50ºC		47	1	Unknown	Unknown
Density @ 15 °C	kg/m^3	61	833.72	0.34	0.50
FAME	%V/V	32	1.78	0.64	0.90
Flash Point PMcc	°C	58	67.66	3.19	4.80
Kinematic Viscosity @ 40 °C	mm^2/s	54	2.8341	0.0464	0.0314
Lubricity by HFRR	µm	33	238.4	98.1	102.0
Nitrogen	mg/kg	15	57.08	11.11	6.49
Pour Point, manual	ºC	28	-15.86	3.94	6.60
Pour Point, automated	ºC	17	-15.82	3.74	4.50
Total Sulphur	mg/kg	57	8.29	2.41	2.83
Total Acid Number	mgKOH/kg	26	0.022	0.034	0.040
Water	mg/kg	49	58.3	38.1	193.6
IBP (automated)	°C	51	176.29	10.45	9.70
10% recovery (automated)	°C	50	219.14	4.78	4.82
50% recovery (automated)	°C	50	273.27	1.83	2.97
90% recovery (automated)	°C	49	328.51	3.35	4.93
FBP (automated)	°C	49	356.80	5.04	7.10
Volume at 250ºC	%V/V	46	29.53	2.49	2.66
Volume at 350ºC	%V/V	45	96.02	1.45	2.66
IBP (manual)	°C	9	177.62	8.71	6.53
10% recovery (manual)	°C	8	217.75	3.50	4.37
50% recovery (manual)	°C	8	273.02	2.72	3.66
90% recovery (manual)	°C	8	329.07	3.34	4.03
FBP (manual)	°C	9	356.82	7.92	4.27
Volume at 250ºC	%V/V	8	29.87	3.85	4.18
Volume at 350ºC	%V/V	8	96.22	2.17	4.18
Total Contamination #1012	mg/kg	17	23.35	11.26	7.01

table 3: summary of tests results of Gasoil #1011 and #1012

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

4.3   COMPARISON OF THE INTERLABORATORY STUDY OF MARCH 2010 WITH PREVIOUS PTS.

	March 2010	*October 2009*	*March 2009*	*October 2008*
Number of reporting labs	72	178	75	150
Number of results reported	1322	4104	1346	2106
Statistical outliers	58	78	45	79
Percentage outliers	4.4%	1.9%	3.3%	3.8%

table 4: comparison with previous proficiency tests.

In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.
The performance of the determinations of the proficiency tests was compared against the requirements of the respective standards. The conclusions are given the following table:

	March 2010	*October 2009*	*March 2009*	*October 2008*
Aromatics (mono-)	--	--	--	n.e.
Aromatics (di-)	--	--	-	n.e.
Aromatics (tri+)	-	++	--	n.e.
Aromatics (poly-)	--	--	-	--
Aromatics (total)	-	--	--	n.e.
Ash content	(++)	(++)	(++)	(++)
Cloud Point	++	++	++	++
Cold Filter Plugging Point	++	-	+/-	--
Colour ASTM	++	++	++	n.e.
CCR 10% residue	++	-	++	--
Density @ 15 °C	++	--	++	+
Distillation – automated mode	++	++	++	++
Distillation – manual mode	+	--	+/-	-
FAME	++	++	++	+
Flash Point PMcc	++	++	-	++
Kinematic Viscosity @ 40 °C	--	--	--	--
Lubricity by HFRR	+	++	+/-	+
Nitrogen content	--	--	--	n.e.
Pour Point	++	++	+/-	n.e.
Oxidation Stability	n.e.	n.e.	n.e.	++
Sulphur	++	+/-	++	--
Total Acid Number	++	++	++	n.e.
Water content	++	++	++	++
Total Contamination	--	--	n.e.	--

table 5: comparison determinations against the standard
results between brackets should used with care, because the average was below the application range

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 similars the standard
　- :　　group performed worse than the standard
　-- :　　group performed much worse than the standard
n.e.:　　not evaluated

APPENDIX 1

Determination of Aromatics (mono-, di-, tri-, poly- and total) on sample #1011; result in %M/M

lab	method	Mono-		Di-		Tri-		Poly-		Total	
225		-----		-----		-----		-----		-----	
312		-----		-----		-----		-----		-----	
317		-----		-----		-----		-----		-----	
334		-----		-----		-----		-----		-----	
353		-----		-----		-----		-----		-----	
430		-----		-----		-----		-----		-----	
463	EN12916	21.195		2.055		0.035		2.09		23.29	
541		-----		-----		-----		-----		-----	
704		-----		-----		-----		-----		-----	
750		-----		-----		-----		-----		-----	
781	IP391	22.34		2.80		0.33		3.13		25.47	Fr 28.60
1006	D6591	21.35		2.67		0.33		3.00		24.35	
1016		-----		-----		-----		-----		-----	
1017		-----		-----		-----		-----		-----	
1033		-----		-----		-----		-----		-----	
1038	IP391	21.5		2.6		0.7		3.3		24.7	
1059	IP391	19.9		2.3		0.1		2.4		22.3	
1080		-----		-----		-----		-----		-----	
1081	IP391	19.4		2.5		0.2		-----		-----	
1108	IP391	22.2		2.8		0.2		3.0		25.2	
1109	D6591	21.39		2.70		0.81		3.51		24.90	
1126		-----		-----		-----		-----		-----	
1140		-----		-----		-----		-----		-----	
1146		-----		-----		-----		-----		-----	
1161	EN12916	20.63		2.23		0.48		2.71		23.35	
1167	D6379	15.65	G(0.01)	0.18	G(0.01)	-----		0.18	DG(0.05)	15.83	G(0.01)
1171		-----		-----		-----		2.19		23.60	
1175		-----		-----		-----		-----		-----	
1194		-----		-----		-----		1.2	DG(0.05)	11.3	G(0.01)
1201	IP391	20.2		2.4		0.4		2.8		22.9	
1203	IP391	20.9		2.2		0.6		2.8		23.7	
1205		-----		-----		-----		-----		-----	
1215		-----		-----		-----		-----		-----	
1218	IP391	20.34		1.91		0.09		2.00		24.34	
1227	IP391	21.7		2.9		0.4		3.3		25.0	
1231		-----		-----		-----		-----		-----	
1251		-----		-----		-----		-----		-----	
1266		-----		-----		-----		-----		-----	
1272	EN12916	23.94		2.51		0.90	Fr 1.07	3.41		27.35	
1281		-----		-----		-----		-----		-----	
1282		-----		-----		-----		-----		-----	
1296		-----		-----		-----		-----		-----	
1310	EN12916	13.450	G(0.01)	1.720		0.550		2.270		17.99	G(0.05)
1316	IP391	20.2		2.2		-----		0.2	DG(0.05)	22.7	
1318		-----		-----		-----		-----		-----	
1409	IP391	21.4		2.6		<0.1		2.7		24.2	
1419	EN12916	20.65		2.85		0.15		3.00		23.65	
1428		-----		-----		-----		2.9		-----	
1430		-----		-----		-----		-----		-----	
1512		-----		-----		-----		-----		-----	
1520	IP391	20.19		1.37	CDG(0.05)	1.38	CG(0.01)	2.38		22.57	
1621		-----		-----		-----		-----		-----	
1634		-----		-----		-----		-----		-----	
1635	EN12916	20.0		1.9		0.1		2.0		22.0	
1636		-----		-----		-----		-----		-----	
1654	EN12916	20.29		2.32		0.25		2.57		22.87	
1656		-----		-----		-----		-----		-----	
1715		-----		-----		-----		-----		-----	
1720		-----		-----		-----		-----		-----	
1730		-----		-----		-----		-----		-----	
1740		-----		-----		-----		-----		-----	
1810		-----		-----		-----		-----		-----	
1811	IP391	22.36		2.39		0.22		2.61		24.97	
1832		-----		-----		-----		-----		-----	
1833	IP391	21.9	Fr 16.15	2.83		0.54		3.37		25.27	Fr 19.52
1842	IP391	21.22		2.50		-----		0.83	G(0.01)	24.55	
1849	IP391	20.46		2.25		0.14		2.39		22.85	
1854	IP391	22.0		-----		-----		2.88		-----	
1861	IP391	21.40		2.91		0.22		3.12		24.53	
1864	EN12916	18.17		1.19	DG(0.05)	0.07		1.3	DG(0.05)	19.43	G(0.05)
1936		-----		-----		-----		-----		-----	
1937		-----		-----		-----		-----		-----	
1938		-----		-----		-----		-----		-----	
1939		-----		-----		-----		-----		-----	
1948	EN12916	22.6	Fr2 28.79	2.58	Fr 4.98	0.11	Fr 0.26	2.69	Fr 5.24	25.29	Fr 34.03
8010		-----		-----		-----		-----		-----	

normality	OK	OK	OK	OK	OK
n	28	26	24	27	26
outliers	2	3	1	5	4
mean (n)	21.07	2.45	0.33	2.76	24.07
st.dev. (n)	1.149	0.328	0.246	0.441	1.230
R(calc.)	3.22	0.92	0.69	1.24	3.44
R(IP391:07)	2.69	0.80	0.62	0.98	3.05
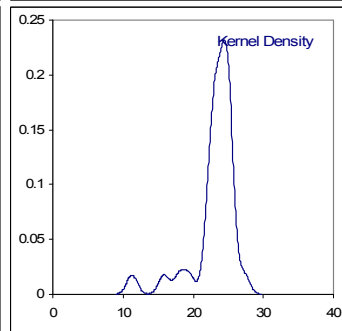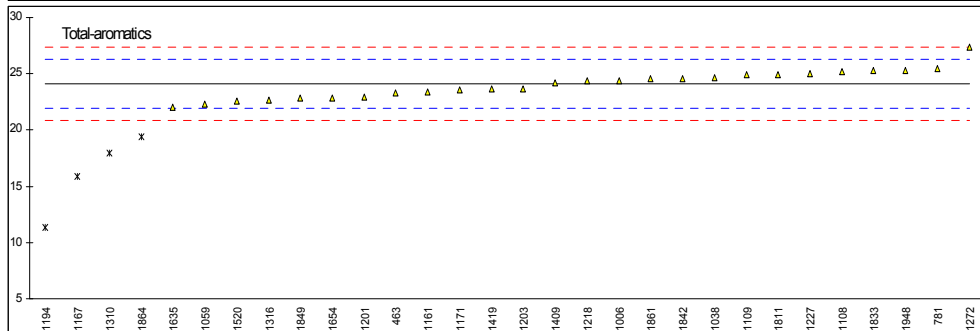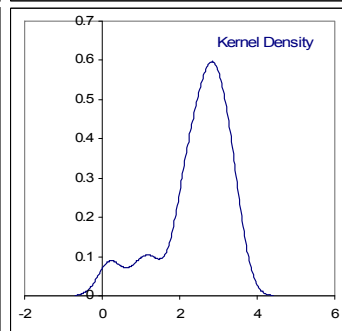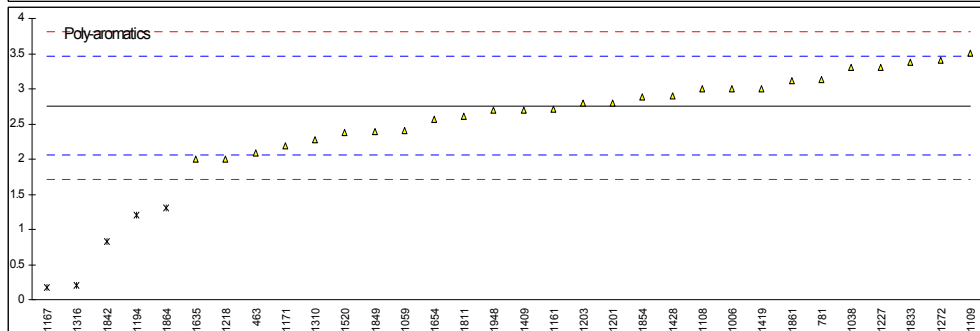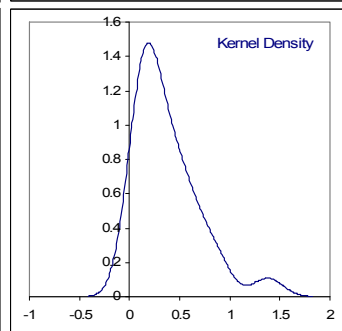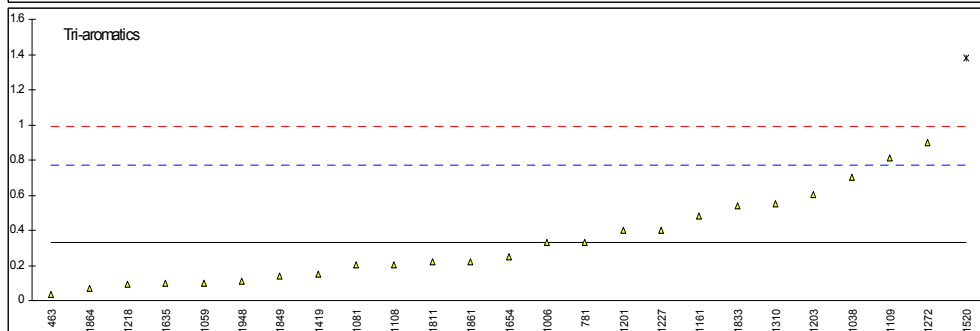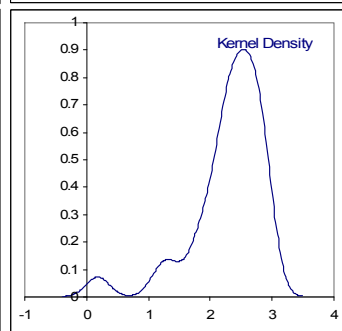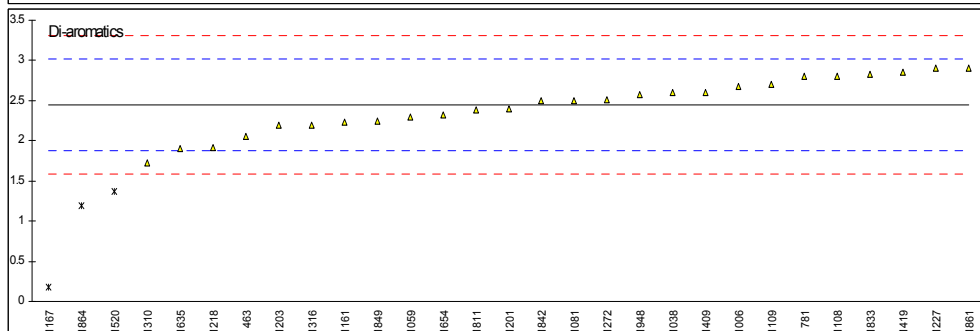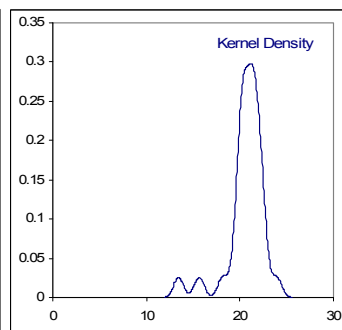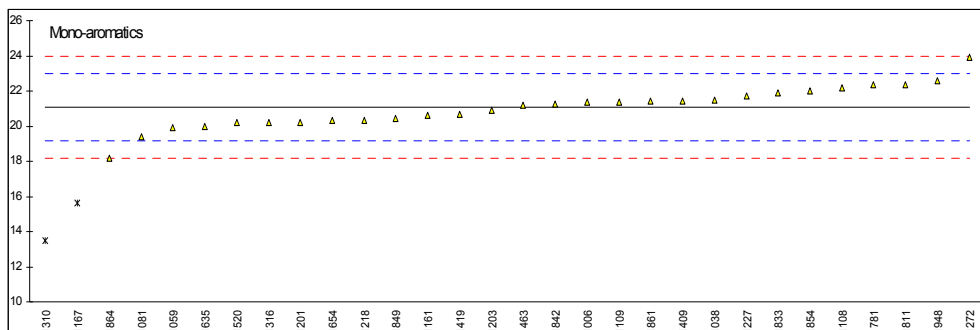
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Determination of Aromatics (mono-, di-, tri-, poly- and total) on sample #1011; result in %M/M (z-scores)

lab	Mono-	Di-	Tri-	Poly-	Total
225	-----	-----	-----	-----	-----
312	-----	-----	-----	-----	-----
317	-----	-----	-----	-----	-----
334	-----	-----	-----	-----	-----
353	-----	-----	-----	-----	-----
430	-----	-----	-----	-----	-----
463	0.14	-1.37	-1.34	-1.92	-0.72
541	-----	-----	-----	-----	-----
704	-----	-----	-----	-----	-----
750	-----	-----	-----	-----	-----
781	1.33	1.23	0.00	1.06	1.28
1006	0.30	0.78	0.00	0.69	0.25
1016	-----	-----	-----	-----	-----
1017	-----	-----	-----	-----	-----
1033	-----	-----	-----	-----	-----
1038	0.45	0.53	1.68	1.55	0.58
1059	-1.21	-0.51	-1.04	-1.03	-1.63
1080	-----	-----	-----	-----	-----
1081	-1.73	0.18	-0.59	-----	-----
1108	1.18	1.23	-0.59	0.69	1.04
1109	0.34	0.88	2.18	2.15	0.76
1126	-----	-----	-----	-----	-----
1140	-----	-----	-----	-----	-----
1146	-----	-----	-----	-----	-----
1161	-0.45	-0.76	0.68	-0.14	-0.66
1167	-5.64	-7.92	-----	-7.40	-7.58
1171	-----	-----	-----	-1.64	-0.43
1175	-----	-----	-----	-----	-----
1194	-----	-----	-----	-4.48	-11.74
1201	-0.90	-0.16	0.32	0.11	-1.08
1203	-0.17	-0.86	1.22	0.11	-0.34
1205	-----	-----	-----	-----	-----
1215	-----	-----	-----	-----	-----
1218	-0.76	-1.88	-1.09	-2.18	0.25
1227	0.66	1.58	0.32	1.55	0.85
1231	-----	-----	-----	-----	-----
1251	-----	-----	-----	-----	-----
1266	-----	-----	-----	-----	-----
1272	2.99	0.22	2.59	1.87	3.01
1281	-----	-----	-----	-----	-----
1282	-----	-----	-----	-----	-----
1296	-----	-----	-----	-----	-----
1310	-7.93	-2.54	1.00	-1.41	-5.59
1316	-0.90	-0.86	-----	-7.35	-1.26
1318	-----	-----	-----	-----	-----
1409	0.35	0.53	-----	-0.17	0.12
1419	-0.43	1.41	-0.82	0.69	-0.39
1428	-----	-----	-----	0.40	-----
1430	-----	-----	-----	-----	-----
1512	-----	-----	-----	-----	-----
1520	-0.91	-3.76	4.76	-1.09	-1.38
1621	-----	-----	-----	-----	-----
1634	-----	-----	-----	-----	-----
1635	-1.11	-1.91	-1.04	-2.18	-1.91
1636	-----	-----	-----	-----	-----
1654	-0.81	-0.44	-0.36	-0.55	-1.11
1656	-----	-----	-----	-----	-----
1715	-----	-----	-----	-----	-----
1720	-----	-----	-----	-----	-----
1730	-----	-----	-----	-----	-----
1740	-----	-----	-----	-----	-----
1810	-----	-----	-----	-----	-----
1811	1.35	-0.20	-0.50	-0.43	0.82
1832	-----	-----	-----	-----	-----
1833	0.87	1.34	0.95	1.75	1.10
1842	0.16	0.18	-----	-5.54	0.44
1849	-0.63	-0.69	-0.86	-1.06	-1.12
1854	0.97	-----	-----	0.34	-----
1861	0.35	1.62	-0.50	1.03	0.42
1864	-3.01	-4.39	-1.18	-4.19	-4.27
1936	-----	-----	-----	-----	-----
1937	-----	-----	-----	-----	-----
1938	-----	-----	-----	-----	-----
1939	-----	-----	-----	-----	-----
1948	1.60	0.46	-1.00	-0.20	1.12
8010	-----	-----	-----	-----	-----

Determination of Ash on sample #1011; result in %M/M

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312		-----		-----	
317	D482	<0.001		-----	
334		-----		-----	
353	IP4	0.0013		-----	
430		-----		-----	
463	D482	<0.001		-----	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D482	0.0006		-----	
1006	D482	0.0004		-----	
1016		-----		-----	
1017		-----		-----	
1033		-----		-----	
1038	D482	0.0003		-----	
1059	ISO6245	<0.001		-----	
1080	ISO6245	0.003	G(0.05)	-----	
1081	D482	0.00013		-----	
1108		-----		-----	
1109	D482	<0.001		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161	ISO6245	0.002		-----	
1167	D482	0.0006		-----	
1171	ISO6245	0.0020151		-----	
1175		-----		-----	
1194		-----		-----	
1201	D482	<0.005		-----	
1203	ISO6245	0.001		-----	
1205		-----		-----	
1215	D482	0.00041		-----	
1218		-----		-----	
1227		-----		-----	
1231	D482	0.00059		-----	
1251	D482	<0.005		-----	
1266		-----		-----	
1272		-----		-----	
1281	ISO6245	n.d.		-----	
1282		-----		-----	
1296		-----		-----	
1310	ISO6245	0.0010		-----	
1316	D482	0.00024	C	-----	First reported 2.4
1318		-----		-----	
1409	D6245	0.011	CG(0.01)	-----	First reported 0.021
1419	ISO6245	0.00056		-----	
1428	ISO6245	<0.001		-----	
1430	D482	0.0068	G(0.01)	-----	
1512		-----		-----	
1520	D482	0.0009		-----	
1621	D482	0.0008		-----	
1634		-----		-----	
1635	D482	0.009	G(0.01)	-----	
1636	D482	0.00066		-----	
1654	D482	0.0016		-----	
1656	IP4	<0.001		-----	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832	ISO6245	0.0016		-----	
1833	D482	0.0012		-----	
1842	D482	0.001		-----	
1849	D482	0.00195		-----	
1854	D482	0.001		-----	
1861		-----		-----	
1864	ISO6245	0.00019		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D482	0.0003		-----	
1948	ISO6245	0.00068		-----	
8010		-----		-----	

normality	OK
n	26
outliers	4
mean (n)	0.00089
st.dev. (n)	0.000568
R(calc.)	0.00159
R(D482:07)	(0.00500)

Application range = 0.001 – 0.180 %M/M
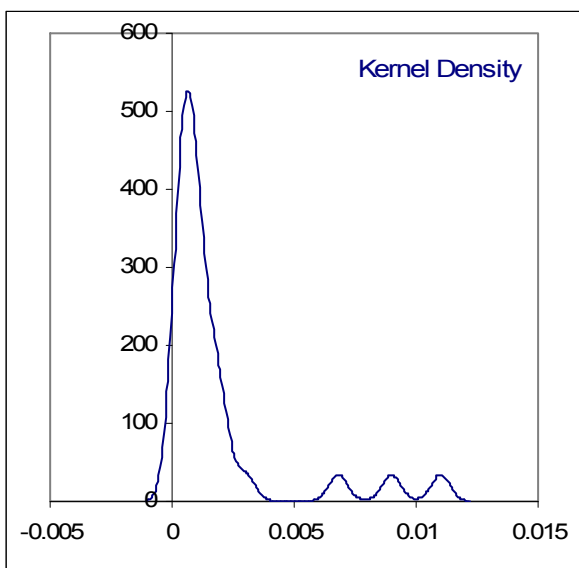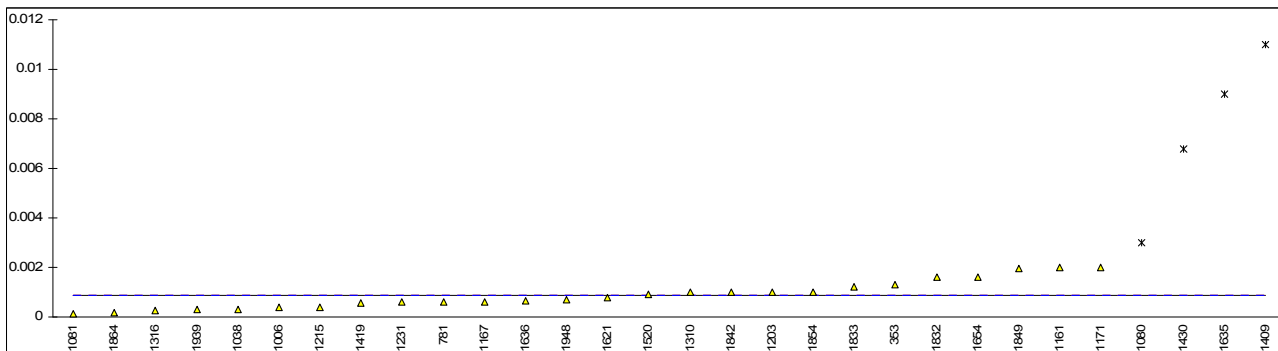
Determination of Calculated Cetane Index ASTM D976 on sample #1011

lab	method	value	mark	z(targ)	remarks
225	D976	54.10		-----	
312	D976	54.3		-----	
317		-----		-----	
334		-----		-----	
353		-----		-----	
430		-----		-----	
463	D976	53.9		-----	
541	D976	54.0		-----	
704		-----		-----	
750		-----		-----	
781	D976	54.4		-----	
1006	D976	53.9		-----	
1016		-----		-----	
1017		-----		-----	
1033	D976	54.0		-----	
1038		-----		-----	
1059		-----		-----	
1080		-----		-----	
1081		-----		-----	
1108		-----		-----	
1109		-----		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161		-----		-----	
1167		-----		-----	
1171		-----		-----	
1175		-----		-----	
1194		-----		-----	
1201	D976	53.8	E	-----	After recalculation C.I. = 54.2
1203		-----		-----	
1205		-----		-----	
1215	D976	53.81		-----	
1218		-----		-----	
1227	D976	53.75	E	-----	After recalculation C.I. = 54.0
1231	D976	54.05		-----	
1251	D976	54.2		-----	
1266		-----		-----	
1272		-----		-----	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316		-----		-----	
1318		-----		-----	
1409		-----		-----	
1419	D976	54.1	C	-----	First reported 55.0
1428		-----		-----	
1430		-----		-----	
1512		-----		-----	
1520	D976	53.97		-----	
1621	D976	54.2		-----	
1634		-----		-----	
1635		-----		-----	
1636		-----		-----	
1654		-----		-----	
1656		-----		-----	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D976	53.99		-----	
1842		-----		-----	
1849		-----		-----	
1854	D976	54.02		-----	
1861		-----		-----	
1864		-----		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D976	54.15		-----	
1948		-----		-----	
8010		-----		-----	

normality   OK
n   18
outliers   0
mean (n)   54.036
st.dev. (n)   0.1736
R(calc.)   0.486
R(D976:06)   unknown   Compare R(iis09G02) = 0.729
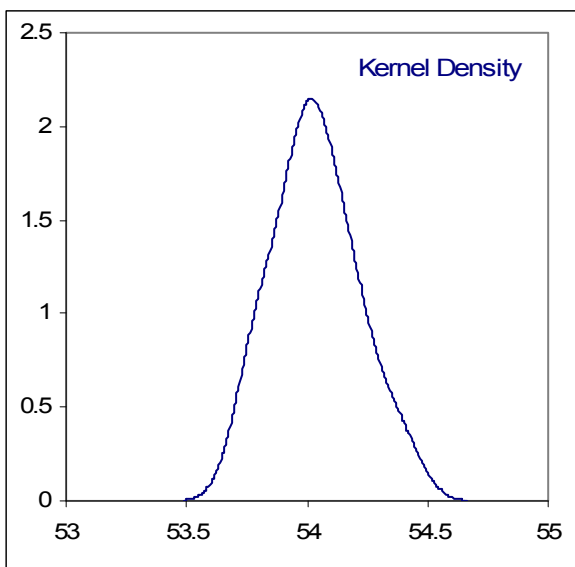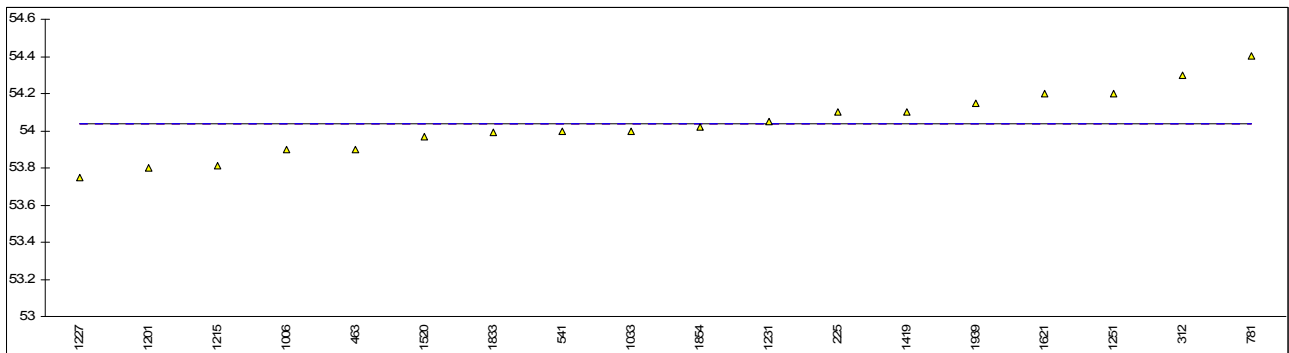
Determination of Calculated Cetane Index D4737 on sample #1011

lab	method	value	mark	z(targ)	remarks
225	D4737	54.70		-----	
312	D4737	53.3		-----	
317		-----		-----	
334		-----		-----	
353	IP380	54.91		-----	
430		-----		-----	
463		-----		-----	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D4737	53.0		-----	
1006		-----		-----	
1016		-----		-----	
1017	D4737	54.87		-----	
1033	IP380	54.9		-----	
1038	D4737	55.2		-----	
1059	ISO4264	54.8	C	-----	Reported the result as D976 instead of D4737
1080	D4737	54.7		-----	
1081	ISO4264	55.2		-----	
1108	D4737	54.9		-----	
1109	D4737	54.9		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161	ISO4264	52.8		-----	
1167	D4737	54.1		-----	
1171	ISO4264	54.566		-----	
1175		-----		-----	
1194	D4737	52.4		-----	
1201	D4737	54.6		-----	
1203	ISO4264	54.9	C	-----	Reported the result as D976 instead of D4737
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227		-----		-----	
1231		-----		-----	
1251	D4737	55.1		-----	
1266		-----		-----	
1272	ISO4264	54.9	C	-----	Reported the result as D976 instead of D4737
1281	ISO4264	54.64		-----	
1282		-----		-----	
1296		-----		-----	
1310	ISO4264	54.3	C	-----	Reported the result as D976 instead of D4737
1316	D4737	52.8		-----	
1318		-----		-----	
1409	ISO4264	54.8		-----	
1419		-----		-----	
1428	ISO4264	54.8	C	-----	Reported the result as D976 instead of D4737
1430		-----		-----	
1512		-----		-----	
1520	D4737	52.74		-----	
1621	D4737	54.8		-----	
1634	ISO4264	54.91		-----	
1635	ISO4264	53.34		-----	
1636	D4737	54.75		-----	
1654	D4737	52.02		-----	
1656	IP380	54.3	C	-----	Reported the result as D976 instead of D4737
1715		-----		-----	
1720	D4737	55.6		-----	
1730		-----		-----	
1740	D4737	52.3		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D4737	54.80		-----	
1842		-----		-----	
1849	D4737	54.675		-----	
1854	D4737	54.718		-----	
1861		-----		-----	
1864	ISO4264	55.06228		-----	
1936	ISO4264	54.7	C	-----	Reported the result as D976 instead of D4737
1937	ISO4264	54.5	C	-----	Reported the result as D976 instead of D4737
1938	D4737	54.4		-----	
1939	D4737	55.34		-----	
1948		-----		-----	
8010		-----		-----	

	Only Proc A	Only proc B
normality	not OK	OK
n	33	9
outliers	0	0
mean (n)	54.798	52.744
st.dev. (n)	0.3013	0.4438
R(calc.)	0.844	1.243
R(D4737:09)	unknown	unknown

Compare R(iis09G02) = 1.030 (A) / 1.316 (B)
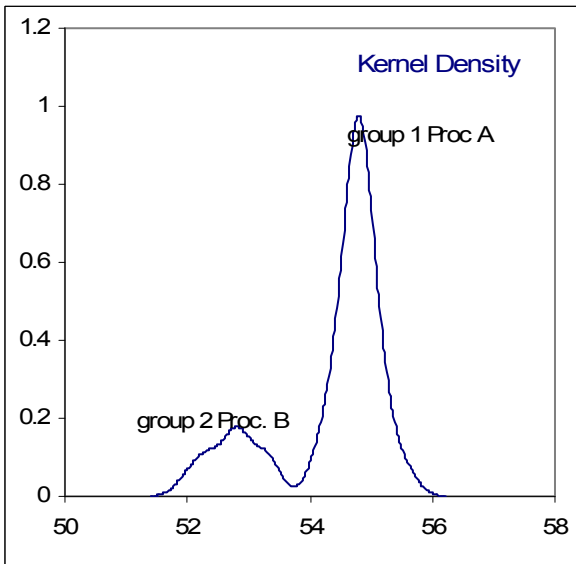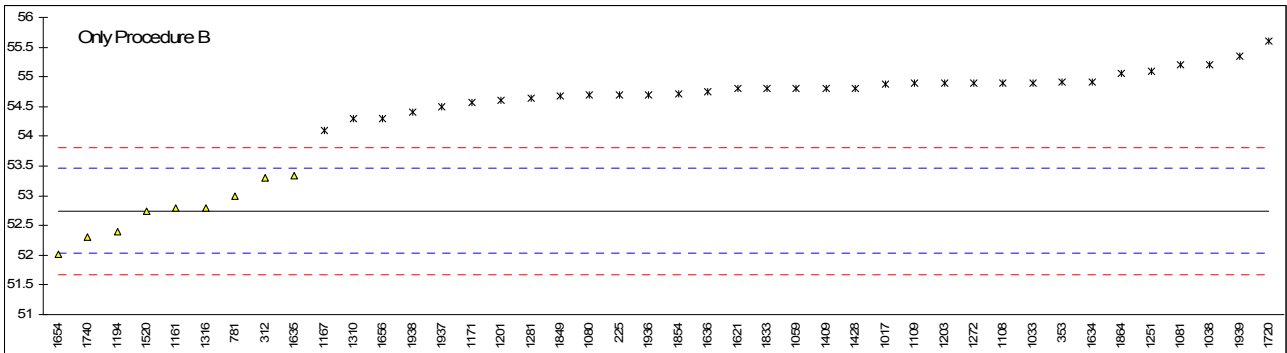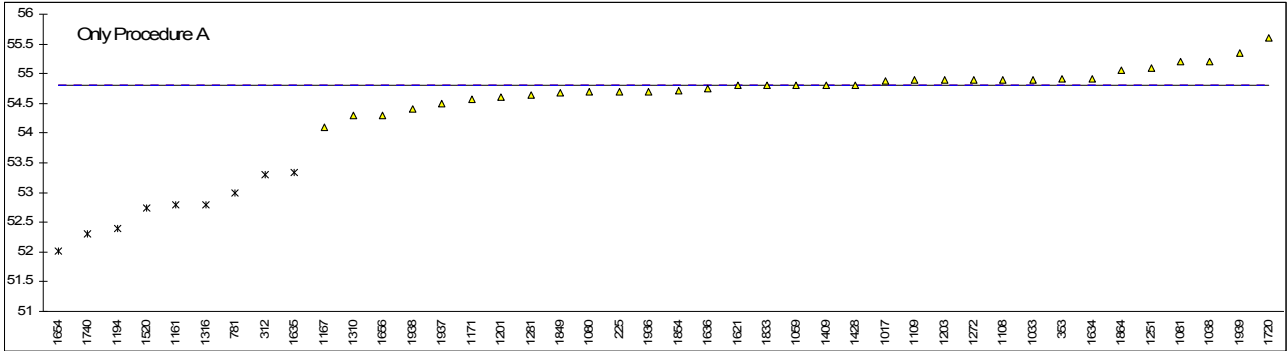
Determination of Cloud Point on sample #1011; result in °C

lab	method	value	mark	z(targ)	remarks
225	D2500	-7		0.17	
312	D2500	-8		-0.53	
317	D5771	-7		0.17	
334	D2500	-8		-0.53	
353	IP219	-7		0.17	
430		-----		-----	
463	D2500	-9		-1.23	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D2500	-7		0.17	
1006		-----		-----	
1016		-----		-----	
1017	D2500	-8		-0.53	
1033	D5772	-7.6		-0.25	
1038	D5773	-6.7		0.38	
1059	ISO3015	-8		-0.53	
1080	D2500	-8		-0.53	
1081	D5772	-7.4		-0.11	
1108	D5771	-6.4		0.59	
1109	D5773	-6.8		0.31	
1126		-----		-----	
1140	D5773	-6.8		0.31	
1146		-----		-----	
1161		-----		-----	
1167		-----		-----	
1171	ISO3015	-8.0		-0.53	
1175	D2500	-7		0.17	
1194	D2500	-6.5		0.52	
1201	D2500	-7		0.17	
1203	EN23015	-5		1.57	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D2500	-7.9		-0.46	
1231	D2500	-8.0		-0.53	
1251	D2500	-7		0.17	
1266	EN23015	-7.00		0.17	
1272		-----		-----	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310	EN23015	-5	C	1.57	First reported -3
1316	D5771	-8		-0.53	
1318		-----		-----	
1409	D2500	-8		-0.53	
1419	EN23015	-6.2		0.73	
1428	EN23015	-7		0.17	
1430	D5771	-6.2		0.73	
1512		-----		-----	
1520	D2500	-8		-0.53	
1621	D2500	-8		-0.53	
1634		-----		-----	
1635	D2500	-10		-1.93	
1636	D2500	-8		-0.53	
1654		-----		-----	
1656	IP444	-7		0.17	
1715	D2500	-8		-0.53	
1720	D2500	-6		0.87	
1730		-----		-----	
1740		-----		-----	
1810	D2500	-7.0		0.17	
1811	D2500	-7		0.17	
1832	ISO3016	-7		0.17	
1833	D2500	-7.0		0.17	
1842	D2500	-7.0		0.17	
1849		-----		-----	
1854	D2500	-7		0.17	
1861		-----		-----	
1864	EN23015	-5		1.57	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D2500	-8		-0.53	
1948	EN2301	-8		-0.53	
8010		-----		-----	

normality	not OK
n	47
outliers	0
mean (n)	-7.24
st.dev. (n)	0.951
R(calc.)	2.66
R(D2500:09)	4.00

Kernel Density
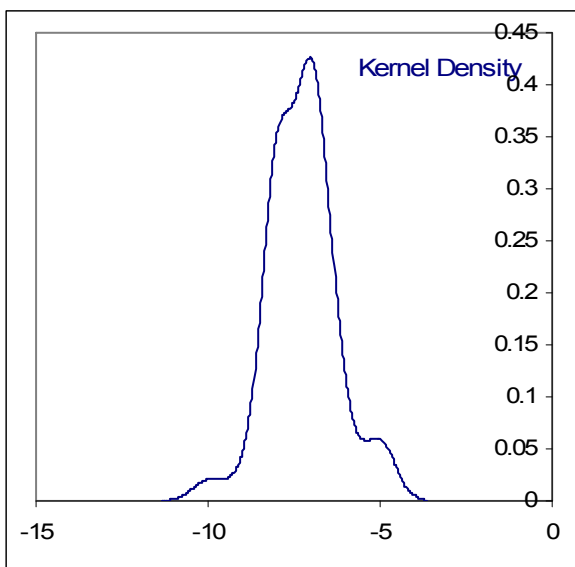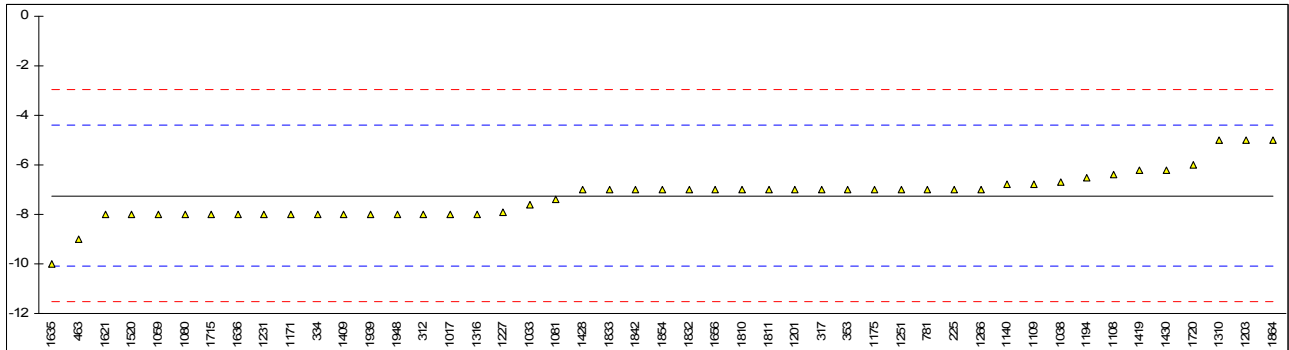
Determination of Cold Filter Plugging Point on sample #1011; result in °C

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	IP309	-16		-0.09	
317	EN116	-16	C	-0.09	First reported -10
334	IP309	-16		-0.09	
353	IP309	-14		1.24	
430		-----		-----	
463	IP309	-16		-0.09	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	IP309	-16		-0.09	
1006	D6371	-16		-0.09	
1016		-----		-----	
1017	EN116	-15.0		0.57	
1033	IP309	-16		-0.09	
1038	IP309	-16		-0.09	
1059	EN116	-16		-0.09	
1080	EN116	-16		-0.09	
1081	EN116	-17		-0.76	
1108	IP309	-14		1.24	
1109	IP309	-16.9		-0.69	
1126		-----		-----	
1140	IP309	-25.7	G(0.01)	-6.54	
1146		-----		-----	
1161	EN116	-13		1.90	
1167	IP309	-15		0.57	
1171	EN116	-15.5		0.24	
1175	IP309	-16		-0.09	
1194	EN116	-16		-0.09	
1201	IP309	-17		-0.76	
1203	EN116	-16		-0.09	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	IP309	-18		-1.42	
1231	D6371	-15.0		0.57	
1251	IP309	-15		0.57	
1266	EN116	-17.00		-0.76	
1272	EN116	-13		1.90	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310	EN116	-15		0.57	
1316	EN116	-15		0.57	
1318		-----		-----	
1409	EN116	-17		-0.76	
1419	EN116	-16		-0.09	
1428	EN116	-17		-0.76	
1430	IP309	-19.0		-2.09	
1512		-----		-----	
1520	IP309	-17		-0.76	
1621		-----		-----	
1634		-----		-----	
1635	EN116	-14		1.24	
1636	D6371	-15		0.57	
1654	IP309	-17.0		-0.76	
1656	IP309	-16		-0.09	
1715	IP309	-15		0.57	
1720		-----		-----	
1730		-----		-----	
1740	EN116	-17		-0.76	
1810	IP309	-15.0		0.57	
1811	IP309	-15		0.57	
1832		-----		-----	
1833	IP309	-15.0		0.57	
1842	IP309	-18.0		-1.42	
1849	IP309	-17.5		-1.09	
1854	IP309	-16		-0.09	
1861		-----		-----	
1864	EN116	-15		0.57	
1936	EN116	-16		-0.09	
1937	IP309	-17		-0.76	
1938	IP309	-16		-0.09	
1939	IP309	-17		-0.76	
1948	IP309	-14		1.24	
8010		-----		-----	

normality	not OK
n	52
outliers	1
mean (n)	-15.86
st.dev. (n)	1.215
R(calc.)	3.40
R(IP309:99)	4.21
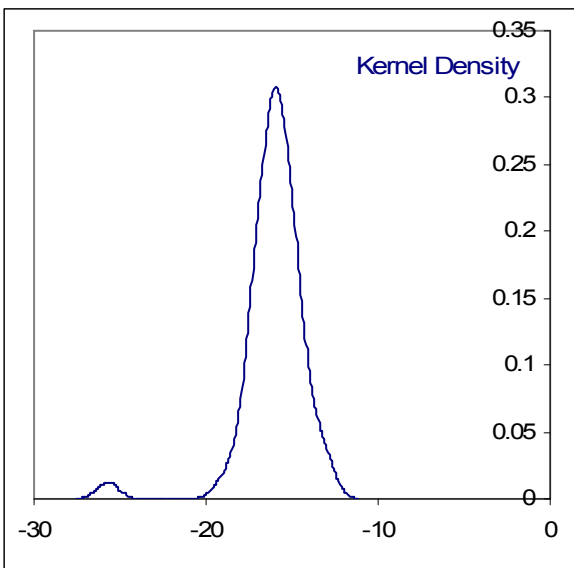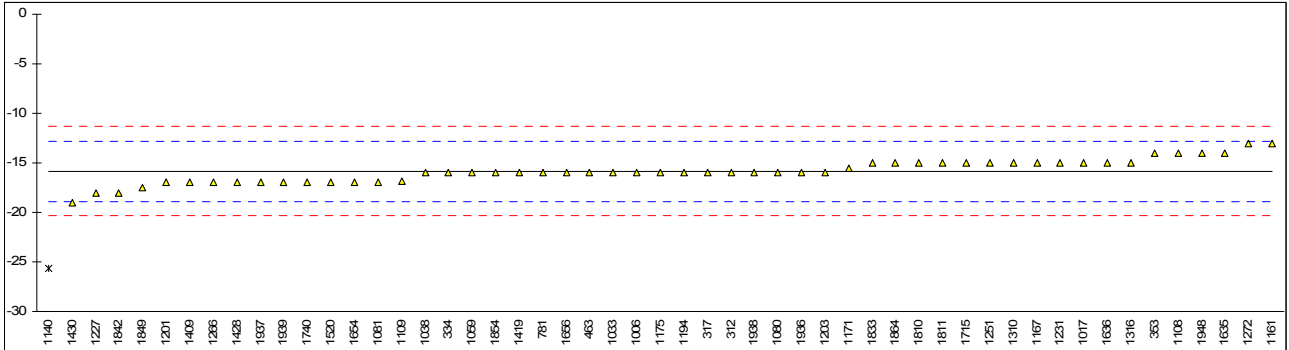
Determination of Colour ASTM on sample #1011;

lab	method	value	mark	z(targ)	remarks
225	D1500	L1.0		-----	
312	D1500	L1.0		-----	
317	D1500	1.0		0.01	
334	D1500	L1.5		-----	
353	D6045	1.0		0.01	
430		-----		-----	
463	D1500	1.0		0.01	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D1500	1.0		0.01	
1006	D1500	L1		-----	
1016		-----		-----	
1017		-----		-----	
1033	D1500	L1.0		-----	
1038	D6045	1.0		0.01	
1059	ISO2049	L1.0		-----	
1080	D1500	L1.0		-----	
1081	D6045	1.0		0.01	
1108	D1500	0.5		-1.39	
1109	D1500	L1.5		-----	
1126		-----		-----	
1140	D6045	L1.0		-----	
1146		-----		-----	
1161	D6045	1.4		1.13	
1167		-----		-----	
1171	D1500	1.16		0.45	
1175		-----		-----	
1194		-----		-----	
1201	D1500	L1.0		-----	
1203	D1500	1.0		0.01	
1205		-----		-----	
1215	D1500	1.0		0.01	
1218		-----		-----	
1227	D1500	1		0.01	
1231	D1500	1.0		0.01	
1251	D1500	L1.0		-----	
1266		-----		-----	
1272	ISO2049	L1.0		-----	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310	Visual	-----	ex	-----	Reported bright and clear
1316		-----		-----	
1318		-----		-----	
1409	D1500	L1.0		-----	
1419		-----		-----	
1428		-----		-----	
1430	D1500	L1.0		-----	
1512		-----		-----	
1520	D1500	1.0		0.01	
1621	D1500	1.0		0.01	
1634		-----		-----	
1635	D1500	L0.5		-----	
1636	D1500	1		0.01	
1654		-----		-----	
1656	D1500	0.5		-1.39	
1715		-----		-----	
1720	D1500	1.1		0.29	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D1500	1.0		0.01	
1842	D1500	1.0		0.01	
1849		-----		-----	
1854	D1500	1		0.01	
1861		-----		-----	
1864		-----		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D1500	L1.5		-----	
1948	D1500	1.3		0.85	
8010		-----		-----	

normality	not OK
n	22
outliers	0
mean (n)	1.00
st.dev. (n)	0.193
R(calc.)	0.54
R(D1500:07)	1.00

Kernel Density
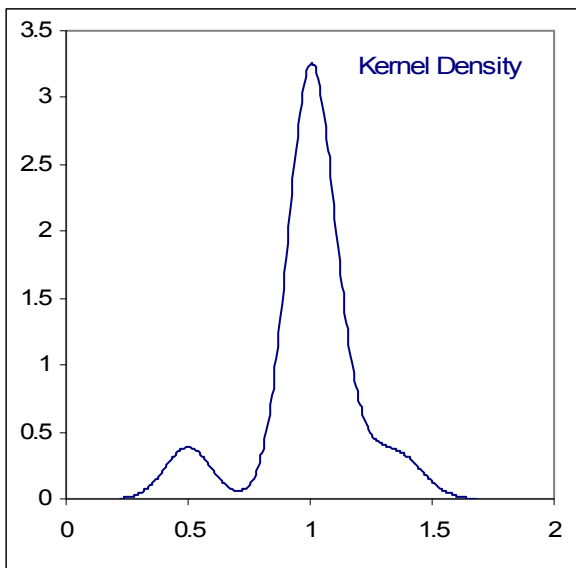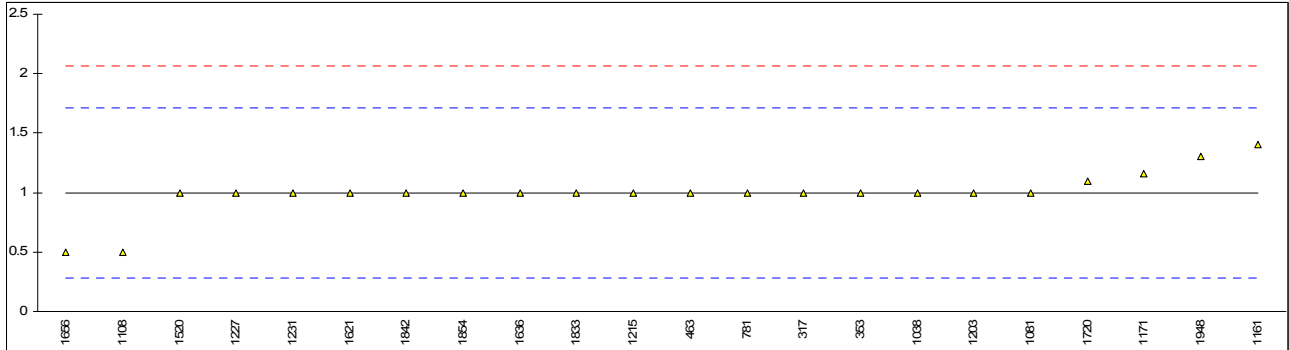
Determination of Conradson Carbon Residue on 10% residue on sample #1011; result in %M/M

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312		-----		-----	
317		-----		-----	
334		-----		-----	
353	IP13	0.0217		0.17	
430		-----		-----	
463	D4530	0.0033		-1.64	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D4530	0.027		0.70	
1006	D524	0.07	G(0.05)	4.95	
1016		-----		-----	
1017	ISO10370	0.05	G(0.05)	2.97	
1033		-----		-----	
1038		-----		-----	
1059	ISO10370	0.02		0.01	
1080	D4530	0.036		1.59	
1081	ISO10370	0.02		0.01	
1108	D4530	0.02		0.01	
1109	D4530	<0.1		<7.93	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161	ISO10370	0.02575		0.57	
1167		-----		-----	
1171	ISO6615	0.050996	G(0.05)	3.07	
1175		-----		-----	
1194		-----		-----	
1201	D189	0.04		1.98	
1203	ISO10370	0.01		-0.98	
1205		-----		-----	
1215	D189	0.01645		-0.34	
1218		-----		-----	
1227		-----		-----	
1231	D4530	0.0199		0.00	
1251	D189	<0.01		<-0.98	
1266		-----		-----	
1272	ISO10370	0.041		2.08	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310	ISO10370	0.02		0.01	
1316	D189	0.03		0.99	
1318		-----		-----	
1409	ISO10370	0.01		-0.98	
1419	ISO10370	0.0140		-0.59	
1428	ISO10370	0.028		0.80	
1430		-----		-----	
1512		-----		-----	
1520	D189	0.018		-0.19	
1621	D4530	0.009		-1.08	
1634		-----		-----	
1635	D189	0.01		-0.98	
1636	D4530	0.0093		-1.05	
1654		-----		-----	
1656		-----		-----	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740	ISO10370	0.006		-1.38	
1810		-----		-----	
1811		-----		-----	
1832	ISO6615	0.0198		-0.01	
1833	ISO10370	0.018		-0.19	
1842	D189	<0.1		<7.93	
1849	D189	0.0230		0.30	
1854	D189	0.015		-0.49	
1861		-----		-----	
1864		-----		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D189	0.05	G(0.05)	2.97	
1948	ISO10370	0.027	C	0.70	First reported 0.0921
8010		-----		-----	

normality   OK
n   28
outliers   4
mean (n)   0.0199
st.dev. (n)   0.00962
R(calc.)   0.0269
R(D189:06e2)   0.0283   Compare R(D4530:07) = 0.1468

Kernel Density
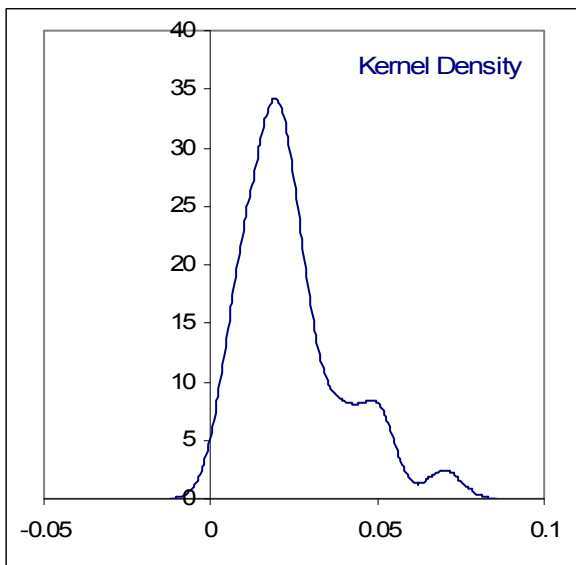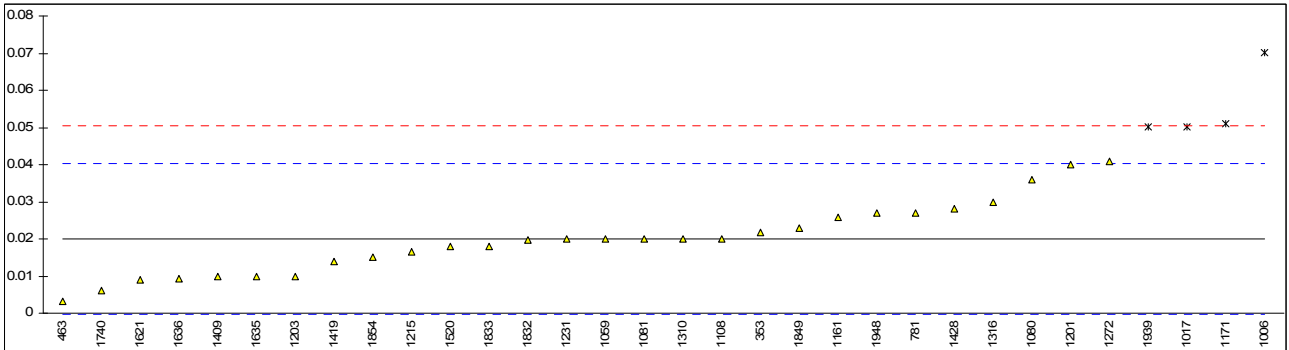
Determination of Copper Corrosion (3 hrs @ 50°C) on sample #1011;

lab	method	value	mark	z(targ)	remarks
225	D130	1A		-----	
312	D130	1A		-----	
317	D130	1A		-----	
334		-----		-----	
353	D130	1A		-----	
430		-----		-----	
463	D130	1A		-----	
541	D130	1		-----	
704		-----		-----	
750		-----		-----	
781	D130	1A		-----	
1006	D130	1A		-----	
1016	D130	1A		-----	
1017	D130	1A		-----	
1033	IP154	1A		-----	
1038	D130	1A		-----	
1059	ISO2160	1A		-----	
1080	D130	1A		-----	
1081	D130	1A		-----	
1108	D130	1A		-----	
1109	D130	1A		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161	ISO2160	1		-----	
1167	D130	1A		-----	
1171	ISO2160	1A		-----	
1175		-----		-----	
1194		-----		-----	
1201	D130	1A		-----	
1203	EN2160	1		-----	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D130	1A		-----	
1231	D130	1A		-----	
1251	D130	1A		-----	
1266		-----		-----	
1272	ISO2160	1A		-----	
1281	ISO2160	1A		-----	
1282		-----		-----	
1296		-----		-----	
1310	ISO2160	1		-----	
1316	D130	1A		-----	
1318		-----		-----	
1409	ISO2160	1A		-----	
1419		-----		-----	
1428	ISO2160	1A		-----	
1430	D130	1A		-----	
1512		-----		-----	
1520	D130	1A		-----	
1621	D130	1A		-----	
1634	D130	1A		-----	
1635	D130	1A		-----	
1636	D130	1A		-----	
1654		-----		-----	
1656	IP154	1A		-----	
1715		-----		-----	
1720	D130	1A		-----	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811	D130	1		-----	
1832	ISO2160	1A		-----	
1833	D130	1A		-----	
1842		-----		-----	
1849	D130	1B		-----	
1854	D130	1A		-----	
1861		-----		-----	
1864	D130	1A		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D130	1A		-----	
1948	D130	1A		-----	
8010		-----		-----	

normality	n.a.
n	47
outliers	0
mean (n)	1
st.dev. (n)	n.a.
R(calc.)	n.a.
R(D130:04e1)	n.a.

Determination of Density @15 °C on sample #1011; result in kg/m^3

lab	method	value	mark	z(targ)	remarks
225	D4052	833.5		-1.24	
312	D4052	833.6		-0.68	
317	D4052	833.8		0.44	
334	D4052	833.7		-0.12	
353	D4052	833.7		-0.12	
430		-----		-----	
463	D4052	833.8		0.44	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D4052	833.8		0.44	
1006	D4052	833.8		0.44	
1016		-----		-----	
1017	ISO12185	833.75		0.16	
1033	IP365	833.7		-0.12	
1038	D4052	833.4		-1.80	
1059	ISO12185	833.6		-0.68	
1080	D4052	833.7		-0.12	
1081	ISO12185	833.8		0.44	
1108	D4052	833.73		0.05	
1109	D4052	833.72		-0.01	
1126	D4052	833.8		0.44	
1140	D4052	833.8		0.44	
1146	D4052	833.76		0.21	
1161	ISO12185	833.63		-0.51	
1167	D4052	833.7		-0.12	
1171	D4052	834.1	C	2.12	First reported 832.96
1175		-----		-----	
1194	ISO12185	819.6	G(0.01)	-79.08	
1201	D4052	833.6		-0.68	
1203	ISO12185	833.8		0.44	
1205	ISO12185	833.65		-0.40	
1215	D1298	833.9		1.00	
1218	D4052	833.80		0.44	
1227	D4052	833.8		0.44	
1231	D4052	833.83		0.61	
1251	D4052	833.6		-0.68	
1266		-----		-----	
1272	ISO12185	833.7		-0.12	
1281	ISO3675	833.33		-2.19	
1282		-----		-----	
1296		-----		-----	
1310	ISO12185	833.9		1.00	
1316	D4052	833.7		-0.12	
1318		-----		-----	
1409	ISO12185	833.7		-0.12	
1419	ISO12185	833.67		-0.29	
1428	ISO12185	833.8		0.44	
1430	D1298	833.6		-0.68	
1512		-----		-----	
1520	D4052	833.74		0.10	
1621	D4052	833.8		0.44	
1634	D4052	833.74		0.10	
1635	D4052	833.5		-1.24	
1636	D4052	833.8		0.44	
1654	D4052	833.76		0.21	
1656	IP365	833.6	C	-0.68	First reported 0.8336
1715	ISO12185	833.8		0.44	
1720	D4052	833.9		1.00	
1730	D4052	833.6		-0.68	
1740	ISO3675	833.8		0.44	
1810	D4052	833.7		-0.12	
1811	D4052	833.7		-0.12	
1832	ISO12185	833.8		0.44	
1833	D4052	833.7		-0.12	
1842		-----		-----	
1849	D4052	833.7		-0.12	
1854	D4052	833.6		-0.68	
1861		-----		-----	
1864	ISO12185	833.72		-0.01	
1936	ISO12185	833.8		0.44	
1937	ISO12185	833.7		-0.12	
1938	D4052	833.8		0.44	
1939	D4052	833.8		0.44	
1948	D4052	833.7		-0.12	
8010		-----		-----	

normality	not OK
n	61
outliers	1
mean (n)	833.72
st.dev. (n)	0.120
R(calc.)	0.34
R(D4052:09)	0.50

Kernel Density
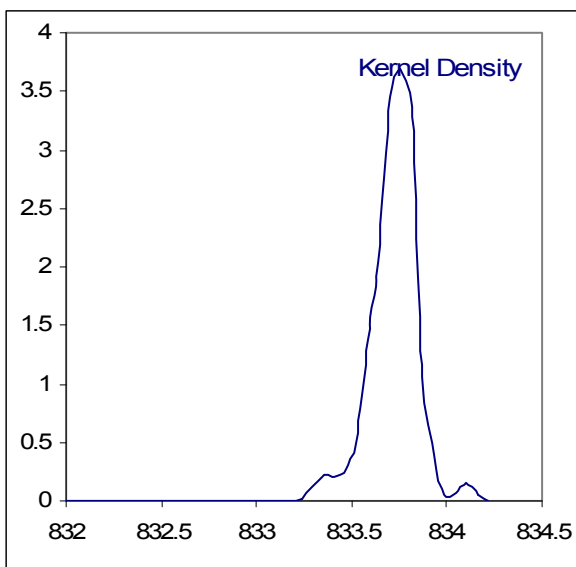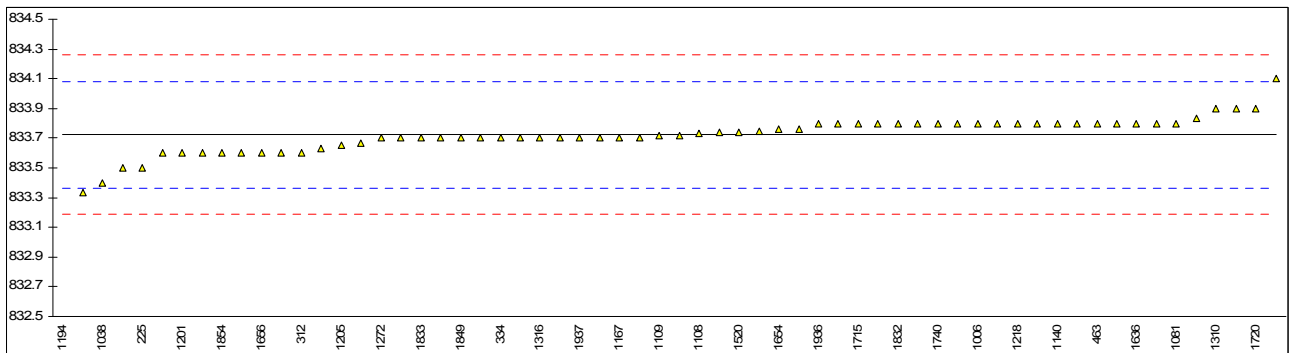
Determination of FAME Content on sample #1011; result in %V/V

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312		-----		-----	
317		-----		-----	
334	EN14078	1.65		-0.40	
353	EN14078	1.829		0.16	
430		-----		-----	
463	EN14078	1.834		0.18	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	EN14078	1.69		-0.27	
1006	EN14078	1.77		-0.02	
1016		-----		-----	
1017	EN14078	1.73		-0.15	
1033		-----		-----	
1038		-----		-----	
1059	EN14078	2.0		0.69	
1080	EN14078	1.8		0.07	
1081		-----		-----	
1108	EN14078	1.66		-0.37	
1109		-----		-----	
1126		-----		-----	
1140		-----		-----	
1146	D7371	2.32		1.69	
1161	EN14078	1.36		-1.30	
1167	EN14078	2.39		1.91	
1171	EN14078	1.57		-0.65	
1175		-----		-----	
1194	EN14078	0	ex	-5.53	Not a real result? False negative?
1201	EN14078	1.9		0.38	
1203	EN14078	1.81		0.10	
1205	EN14078	1.9		0.38	
1215		-----		-----	
1218		-----		-----	
1227		-----		-----	
1231	EN14078	1.73		-0.15	
1251		-----		-----	
1266		-----		-----	
1272		-----		-----	
1281	EN14078	1.63		-0.46	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316	EN14078	1.64		-0.43	
1318		-----		-----	
1409	EN14078	1.8		0.07	
1419	EN14078	1.79		0.04	
1428	EN14078	1.80		0.07	
1430		-----		-----	
1512		-----		-----	
1520	EN14078	1.69		-0.27	
1621		-----		-----	
1634		-----		-----	
1635	EN14078	1.6		-0.55	
1636	EN14078	2.1		1.00	
1654		-----		-----	
1656	EN14078	1.9		0.38	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810	EN14078	1.53		-0.77	
1811	EN14078	1.67		-0.33	
1832		-----		-----	
1833	EN14078	1.70		-0.24	
1842	EN14078	1.5		-0.86	
1849		-----		-----	
1854		-----		-----	
1861		-----		-----	
1864	EN14078	1.45	C	-1.02	First reported 4.46
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939		-----		-----	
1948	EN14078	2.14		1.13	
8010		-----		-----	

			Compared against EN14078:2009	
normality	OK		normality	OK
n	32		n	32
outliers	1		outliers	1
mean (n)	1.78		mean (n)	1.78
st.dev. (n)	0.228		st.dev. (n)	0.228
R(calc.)	0.64		R(calc.)	0.64
R(EN14078:03)	0.90		R(EN14078:09)	0.11
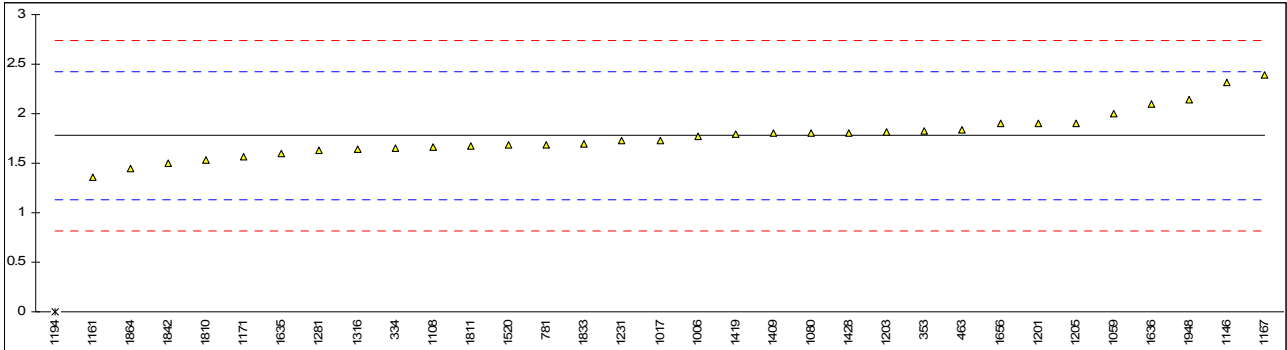
Reported results evaluated using EN14078:2003
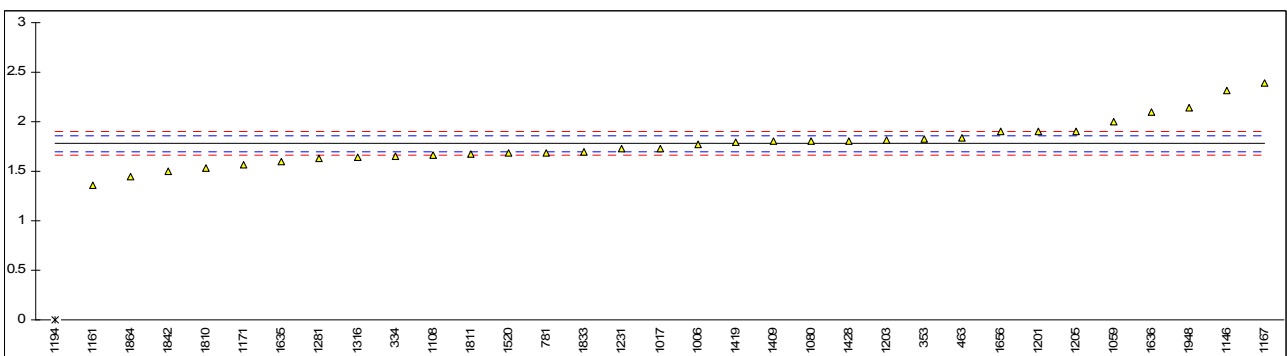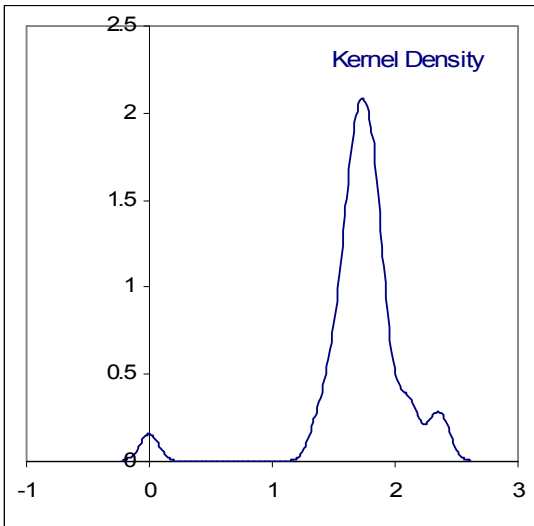
Reported results compared with EN14078:2009 reproducibility requirements

Determination of Flash Point PMcc on sample #1011; result in °C

lab	method	value	mark	z(targ)	remarks
225	D93-	67.0		-0.39	
312	D93-AF	66.63		-0.60	
317	D93-AE	67.5		-0.09	
334	D93-AF	69		0.78	
353	IP34-ME	67.725		0.04	
430		-----		-----	
463	D93-AE	69.0		0.78	
541	D93-MF	65		-1.55	
704		-----		-----	
750		-----		-----	
781	D93-AF	67.5		-0.09	
1006	D93-AE	68.5		0.49	
1016		-----		-----	
1017	ISO2719-AF	67.5		-0.09	
1033	IP34-AF	72	G(0.05)	2.53	
1038	D93-AE	68.5		0.49	
1059	ISO2719-AE	67.0		-0.39	
1080	D93-AE	67.0		-0.39	
1081	D93-AE	68.5		0.49	
1108	D93-AE	66.0		-0.97	
1109	D93-AF	68.0		0.20	
1126	D93-AE	67		-0.39	
1140	D93-AF	66.5		-0.68	
1146	D93-AE	70.62		1.72	
1161	ISO2719-AE	69.0		0.78	
1167	D93-AE	69		0.78	
1171	ISO2719-MF	67.37		-0.17	
1175		-----		-----	
1194		-----		-----	
1201	D93-AE	68.5		0.49	
1203	ISO2719-AF	67.0		-0.39	
1205	D93-AF	66.0		-0.97	
1215	D93-AF	69.0		0.78	
1218		-----		-----	
1227		-----		-----	
1231	D93-AF	69.2		0.90	
1251	D93-AE	68.5		0.49	
1266	ISO2719-AF	67.20		-0.27	
1272	ISO2719-AF	67		-0.39	
1281	ISO2719-AE	77.83	G(0.01)	5.93	
1282		-----		-----	
1296		-----		-----	
1310	ISO2719-MF	69		0.78	
1316	D93-AF	73	G(0.01)	3.11	
1318		-----		-----	
1409	ISO2719-AF	68.0		0.20	
1419	ISO2719-AE	67.5		-0.09	
1428	ISO2719-AE	66.5		-0.68	
1430		-----		-----	
1512	D93-AF	67.5		-0.09	
1520	D93-MF	66.2		-0.85	
1621	D93-MF	70.0		1.36	
1634	D93-AE	68.5		0.49	
1635	D93-MF	67.0		-0.39	
1636	D93-AE	67.0		-0.39	
1654	D93-AE	67.5		-0.09	
1656	IP34-AF	68.6		0.55	
1715	D93-AE	67		-0.39	
1720	D93-AE	68.0		0.20	
1730		-----		-----	
1740	ISO2719-AE	67.5		-0.09	
1810	D93-AF	66.5		-0.68	
1811	D93-AF	66.5		-0.68	
1832	ISO2719-AF	67.0		-0.39	
1833	D93-MF	66		-0.97	
1842	D93-AF	67		-0.39	
1849	D93-AE	68.5		0.49	
1854	D93-MF	66		-0.97	
1861		-----		-----	
1864	ISO2719-AF	66.8		-0.50	
1936	ISO2719-AE	69		0.78	
1937	ISO2719AE	68		0.20	
1938	D93-AE	67		-0.39	
1939	D93-MF	68		0.20	
1948	D93-AE	70		1.36	
8010		-----		-----	

normality	not OK
n	58
outliers	3
mean (n)	67.66
st.dev. (n)	1.141
R(calc.)	3.19
R(D93:10)	4.80

	Only AE data:	Only AF data:	Only MF data:
normality	OK	OK	OK
n	27	20	9
outliers	1	2	0
mean (n)	68.02	67.42	67.17
st.dev. (n)	1.071	0.934	1.601
R(calc.)	3.00	2.61	4.48
R(D93:10)	4.83	4.79	4.77
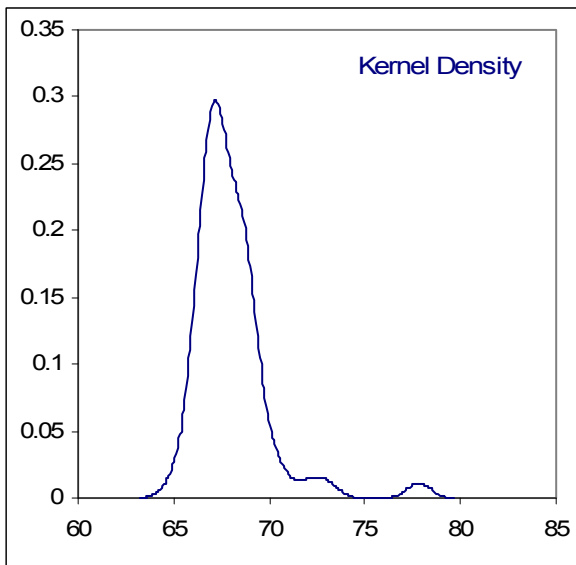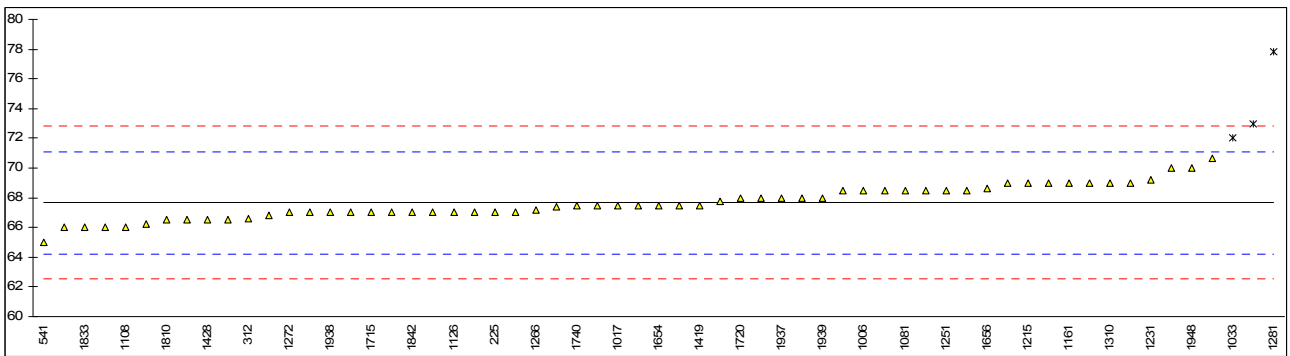
Determination of Kinematic Viscosity @ 40°C on sample #1011; result in mm^2/s

lab	method	value	mark	z(targ)	remarks
225	D445	2.831		-0.28	
312	D445	2.817		-1.53	
317	D445	2.818		-1.44	
334		-----		-----	
353	IP71	2.8421		0.71	
430		-----		-----	
463	D445	2.8302		-0.35	
541	D445	2.8750	C	3.64	First reported 2.7620
704		-----		-----	
750		-----		-----	
781	D445	2.829		-0.46	
1006	D445	2.8256		-0.76	
1016		-----		-----	
1017	D445	2.830		-0.37	
1033	IP71	2.84	C	0.52	First reported 2.45
1038	D445	2.8262		-0.71	
1059	ISO3104	2.818		-1.44	
1080	D445	2.825		-0.81	
1081	D445	2.823		-0.99	
1108	D445	3.152	G(0.01)	28.31	
1109	D445	2.8318		-0.21	
1126	D445	2.852		1.59	
1140	D445	2.847		1.15	
1146	D445	2.8241		-0.89	
1161	ISO3104	2.850		1.41	
1167	D445	2.861		2.39	
1171	ISO3104	2.803046		-2.77	
1175		-----		-----	
1194		-----		-----	
1201	D445	2.834		-0.01	
1203	ISO3104	2.822		-1.08	
1205		-----		-----	
1215	D445	2.830		-0.37	
1218		-----		-----	
1227	D445	2.8308		-0.30	
1231	D445	2.829		-0.46	
1251	D445	2.845		0.97	
1266		-----		-----	
1272	ISO3104	2.861		2.39	
1281	ISO3104	2.831		-0.28	
1282		-----		-----	
1296		-----		-----	
1310	ISO3104	2.84809		1.24	
1316	D445	2.830		-0.37	
1318		-----		-----	
1409	ISO3104	2.832		-0.19	
1419	ISO3104	2.838		0.34	
1428	ISO3104	2.844		0.88	
1430	D445	2.877		3.82	
1512		-----		-----	
1520	D445	2.8442		0.90	
1621	D445	2.832		-0.19	
1634		-----		-----	
1635	D445	2.871		3.28	
1636	D445	2.8437		0.85	
1654	D445	2.8566		2.00	
1656	IP71	2.713	G(0.01)	-10.79	
1715		-----		-----	
1720	D7042	2.841		0.61	
1730		-----		-----	
1740	ISO3104	2.8346		0.04	
1810	D445	2.8401		0.53	
1811	D445	2.8352		0.09	
1832	ISO3104	2.8263	C	-0.70	First reported 2.7661
1833	D445	2.822		-1.08	
1842		-----		-----	
1849	D445	2.8344		0.02	
1854	D445	2.786		-4.29	
1861		-----		-----	
1864	ISO3104	2.822		-1.08	
1936	D445	2.818		-1.44	
1937	D445	2.816		-1.62	
1938	D445	2.8230		-0.99	
1939	D445	2.819		-1.35	
1948	ISO3104	2.8275		-0.59	
8010		-----		-----	

normality	not OK
n	54
outliers	2
mean (n)	2.8341
st.dev. (n)	0.01657
R(calc.)	0.0464
R(D445:09)	0.0314
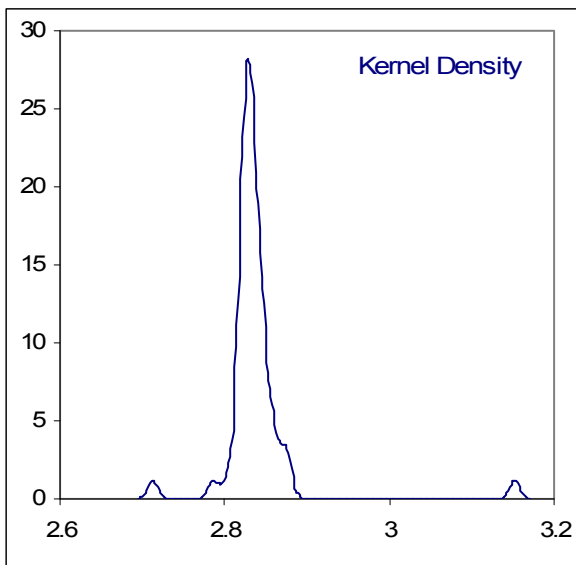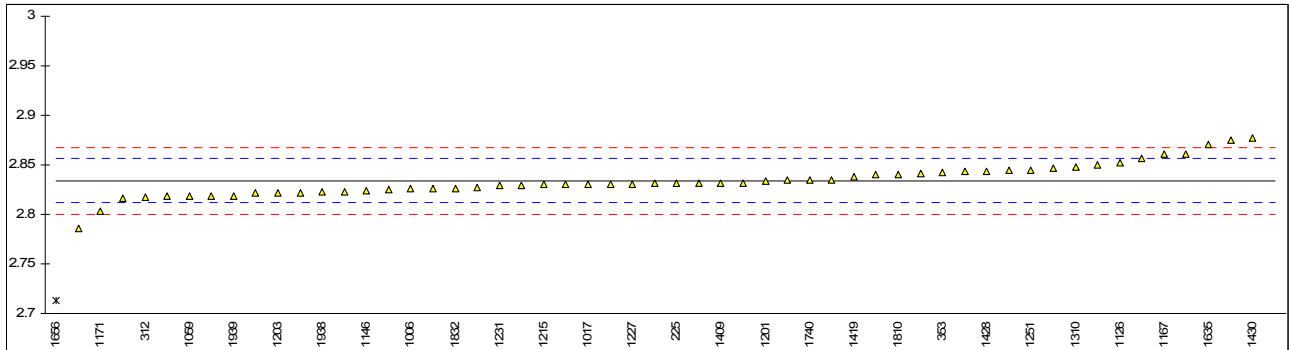
Determination of Lubricity by HFRR on sample #1011; result in µm

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	ISO12156	305		1.83	
317		-----		-----	
334		-----		-----	
353		-----		-----	
430	ISO12156	203		-0.97	
463	ISO12156	237.2		-0.03	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	ISO12156	220		-0.50	
1006	D6079	236.5		-0.05	
1016		-----		-----	
1017		-----		-----	
1033	IP450	211		-0.75	
1038	IP450	217		-0.59	
1059	ISO12156	235		-0.09	
1080	ISO12156	257		0.51	
1081	ISO12156	216		-0.61	
1108	ISO12156	215		-0.64	
1109	IP450	206		-0.89	
1126		-----		-----	
1140	IP450	226		-0.34	
1146		-----		-----	
1161	ISO12156	290.93		1.44	
1167	ISO12156	379.4	G(0.05)	3.87	
1171		-----		-----	
1175		-----		-----	
1194		-----		-----	
1201	ISO12156	309		1.94	
1203	ISO12156	209		-0.81	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227		-----		-----	
1231		-----		-----	
1251	ISO12156	270		0.87	
1266		-----		-----	
1272		-----		-----	
1281	ISO12156	296		1.58	
1282		-----		-----	
1296		-----		-----	
1310	ISO12156	226		-0.34	
1316	ISO12156	236		-0.06	
1318		-----		-----	
1409	ISO12156	259		0.57	
1419	ISO12156	208		-0.83	
1428	ISO12156	200		-1.05	
1430		-----		-----	
1512		-----		-----	
1520	ISO12156	312		2.02	
1621		-----		-----	
1634		-----		-----	
1635	ISO12156	278	C	1.09	First reported 672
1636		-----		-----	
1654		-----		-----	
1656	IP450	233		-0.15	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810	ISO12156	191		-1.30	
1811	ISO12156	210		-0.78	
1832		-----		-----	
1833	ISO12156	230		-0.23	
1842		-----		-----	
1849	ISO12156	230.5		-0.22	
1854	ISO12156	270		0.87	
1861		-----		-----	
1864	ISO12156	191		-1.30	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939		-----		-----	
1948	ISO12156	231.6		-0.19	
8010		-----		-----	

normality	not OK
n	33
outliers	1
mean (n)	238.4
st.dev. (n)	35.02
R(calc.)	98.1
R(ISO12156:97)	102.0
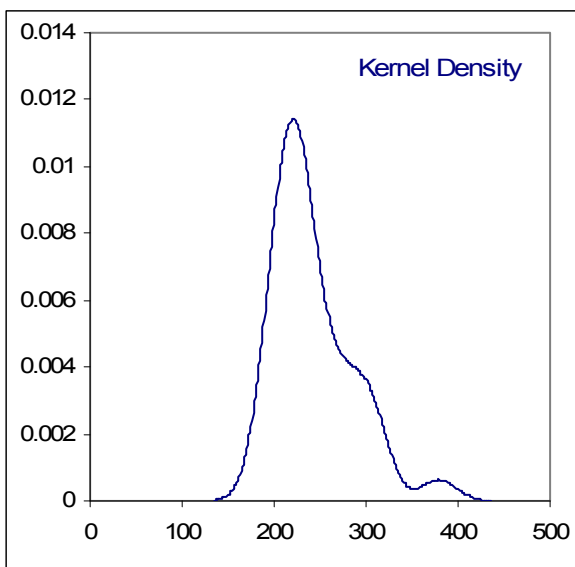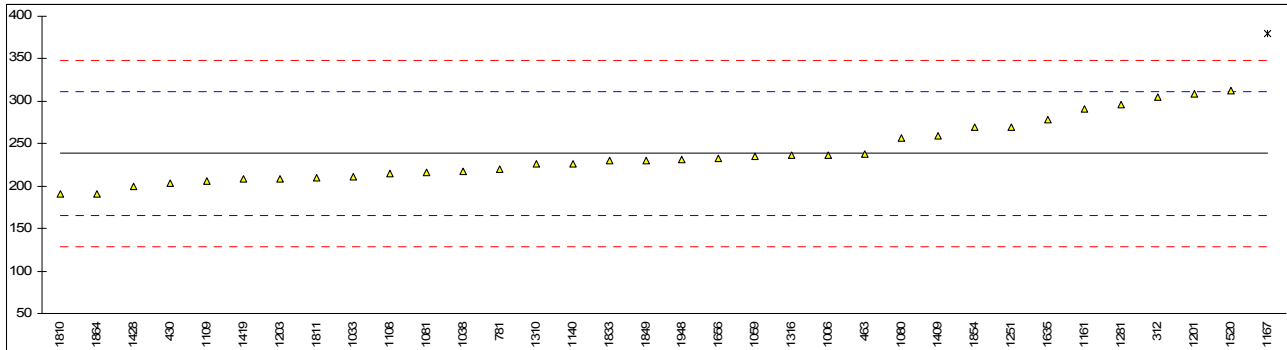
Determination of Nitrogen on sample #1011; result in mg/kg

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312		-----		-----	
317	D4629	68	G(0.05)	4.71	
334		-----		-----	
353		-----		-----	
430		-----		-----	
463	D4629	56.25		-0.36	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781		-----		-----	
1006		-----		-----	
1016		-----		-----	
1017		-----		-----	
1033		-----		-----	
1038	D5762	65		3.41	
1059		-----		-----	
1080	D4629	57.6		0.22	
1081		-----		-----	
1108	D4629	59.3		0.96	
1109	D4629	58.80		0.74	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161		-----		-----	
1167		-----		-----	
1171		-----		-----	
1175		-----		-----	
1194		-----		-----	
1201	D4629	44	G(0.05)	-5.64	
1203	D6366	55.8	C	-0.55	First reported 70
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D4629	54.5		-1.11	
1231		-----		-----	
1251		-----		-----	
1266		-----		-----	
1272		-----		-----	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316		-----		-----	
1318		-----		-----	
1409		-----		-----	
1419	D4629	54.97		-0.91	
1428		-----		-----	
1430		-----		-----	
1512		-----		-----	
1520	D4629	53.0		-1.76	
1621		-----		-----	
1634		-----		-----	
1635	D4629	62.219		2.22	
1636		-----		-----	
1654		-----		-----	
1656		-----		-----	
1715		-----		-----	
1720	D4629	55.54		-0.66	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D4629	52.6		-1.93	
1842	inhouse	53		-1.76	
1849		-----		-----	
1854		-----		-----	
1861	D4629	63.70		2.85	
1864		-----		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D4629	53.9		-1.37	
1948		-----		-----	
8010		-----		-----	

normality	OK
n	15
outliers	2
mean (n)	57.08
st.dev. (n)	3.968
R(calc.)	11.11
R(D4629:09)	6.49
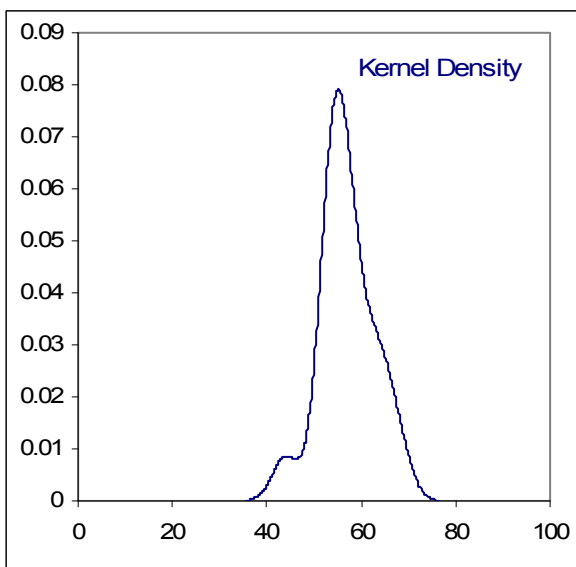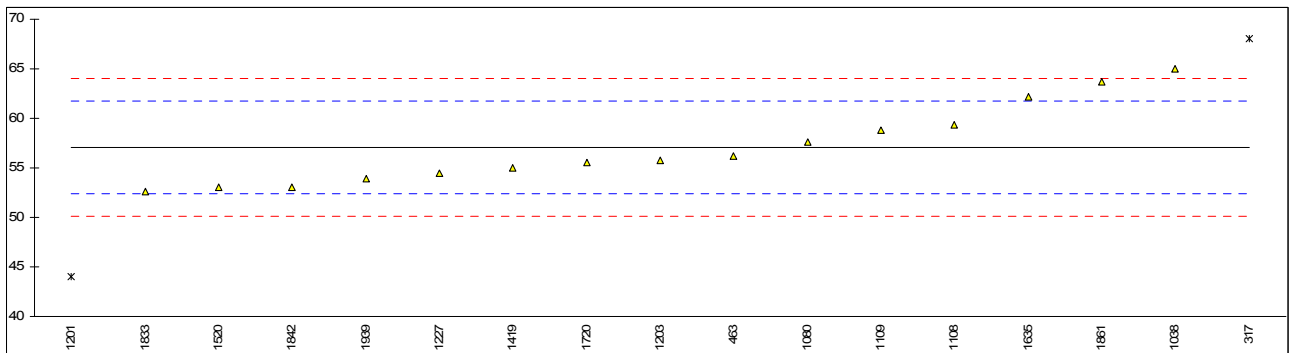
Determination of Pour Point, Manual on sample #1011; result in °C

lab	method	value	mark	z(targ)	remarks
225	D97	-15		0.36	
312	D97	-18		-0.91	
317		-----		-----	
334	D97	-15		0.36	
353	IP15	-21	DG(0.05)	-2.18	
430		-----		-----	
463		-----		-----	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D97	-15		0.36	
1006	D97	-15		0.36	
1016		-----		-----	
1017		-----		-----	
1033	IP15	-15		0.36	
1038		-----		-----	
1059		-----		-----	
1080		-----		-----	
1081		-----		-----	
1108	D97	-18		-0.91	
1109		-----		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161		-----		-----	
1167		-----		-----	
1171	ISO3016	-15.0		0.36	
1175	D97	-15		0.36	
1194	D97	-15		0.36	
1201		-----		-----	
1203	ISO3016	-14		0.79	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D97	-16		-0.06	
1231		-----		-----	
1251		-----		-----	
1266		-----		-----	
1272		-----		-----	
1281	ISO3016	-15		0.36	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316		-----		-----	
1318		-----		-----	
1409	D97	-18		-0.91	
1419		-----		-----	
1428		-----		-----	
1430		-----		-----	
1512		-----		-----	
1520	D97	-15		0.36	
1621	D97	-15		0.36	
1634		-----		-----	
1635	D97	-18		-0.91	
1636	D97	-15		0.36	
1654	D97	-15.0		0.36	
1656	IP15	-21	CDG(0.05)	-2.18	First reported -24
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740	ISO3016	-18		-0.91	
1810		-----		-----	
1811	D97	-15		0.36	
1832	ISO3016	-15		0.36	
1833	D97	-18		-0.91	
1842	D97	-15		0.36	
1849		-----		-----	
1854	D97	-15		0.36	
1861		-----		-----	
1864	D97	-15		0.36	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D97	-18		-0.91	
1948	EN2301	-18		-0.91	
8010		-----		-----	

normality	not OK
n	28
outliers	2
mean (n)	-15.86
st.dev. (n)	1.407
R(calc.)	3.94
R(D97:09)	6.60

Kernel Density
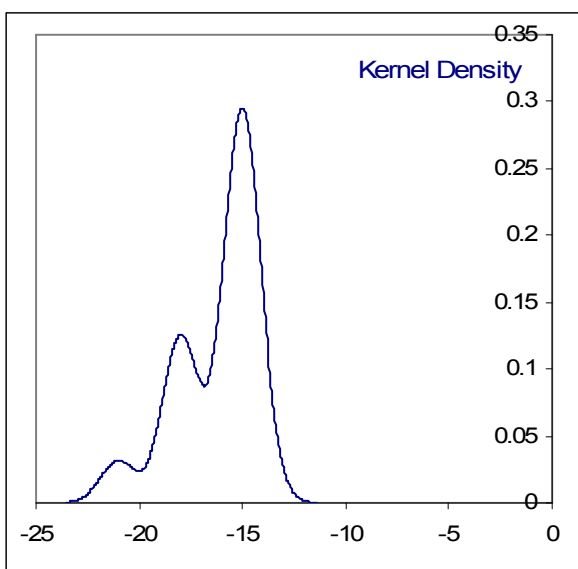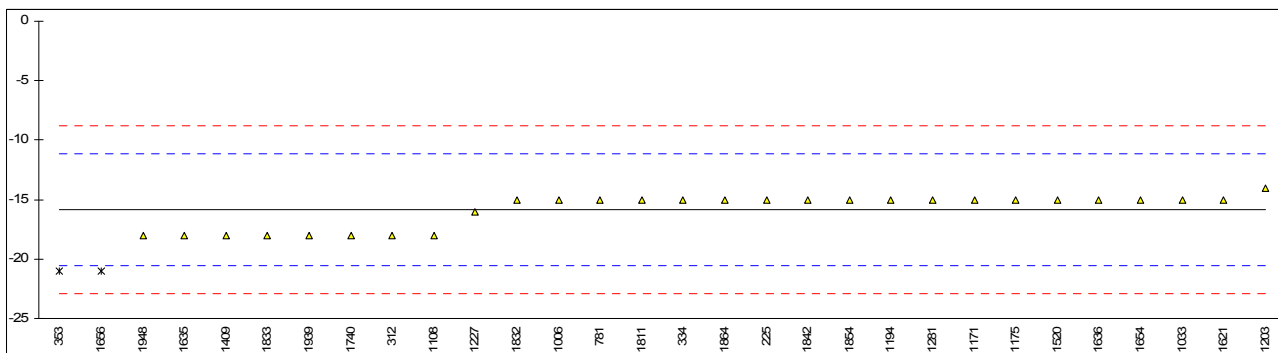
Determination of Pour Point, Automated on sample #1011; result in °C

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	D5950	-17		-0.73	
317	D6749	-16		-0.11	
334		-----		-----	
353		-----		-----	
430		-----		-----	
463	D6892	-15.0		0.51	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781		-----		-----	
1006		-----		-----	
1016		-----		-----	
1017	D5950	-15		0.51	
1033		-----		-----	
1038		-----		-----	
1059	ISO3016	-15		0.51	
1080	ISO3016	-15		0.51	
1081	D5950	-15		0.51	
1108	D5950	-15		0.51	
1109		-----		-----	
1126		-----		-----	
1140		-----		-----	
1146		-----		-----	
1161		-----		-----	
1167		-----		-----	
1171		-----		-----	
1175		-----		-----	
1194		-----		-----	
1201	D5950	-15		0.51	
1203		-----		-----	
1205		-----		-----	
1215	D5950	-15.0		0.51	
1218		-----		-----	
1227		-----		-----	
1231	D5950	-15		0.51	
1251	D5950	-15		0.51	
1266		-----		-----	
1272		-----		-----	
1281		-----		-----	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316	D5950	-15		0.51	
1318		-----		-----	
1409		-----		-----	
1419		-----		-----	
1428		-----		-----	
1430	D5950	-18		-1.35	
1512		-----		-----	
1520		-----		-----	
1621		-----		-----	
1634		-----		-----	
1635		-----		-----	
1636	D6749	-16		-0.11	
1654		-----		-----	
1656		-----		-----	
1715	D6749	-19		-1.98	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D5950	-18		-1.35	
1842		-----		-----	
1849		-----		-----	
1854		-----		-----	
1861		-----		-----	
1864		-----		-----	
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939		-----		-----	
1948		-----		-----	
8010		-----		-----	

normality	not OK
n	17
outliers	0
mean (n)	-15.82
st.dev. (n)	1.334
R(calc.)	3.74
R(D5950:07)	4.50

R=1°　　　　　　　　Compare R(D5950:07-R=3°) = 6.10

Kernel Density
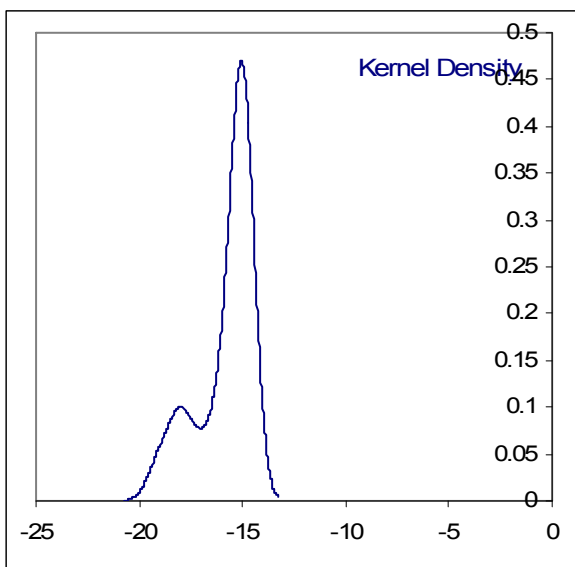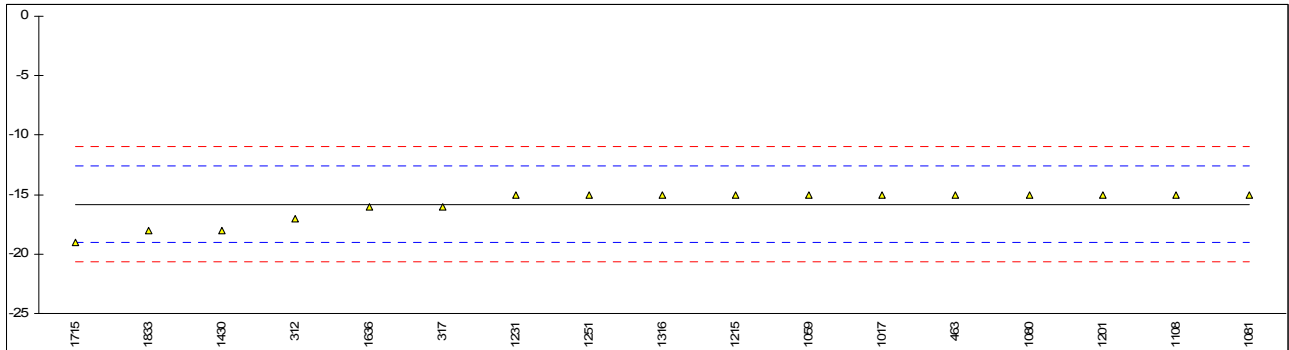
Determination of Sulphur Content on sample #1011; result in mg/kg

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	D5453	8.1		-0.19	
317	ISO20884	8		-0.29	
334	D5453	7.9		-0.38	
353	IP531	7.73		-0.55	
430		-----		-----	
463	D5453	8.3		0.01	
541	D5453	8		-0.29	
704		-----		-----	
750		-----		-----	
781	D2622	8.3		0.01	
1006	D5453	8.6		0.31	
1016		-----		-----	
1017		-----		-----	
1033		-----		-----	
1038	D2622	6.83		-1.44	
1059	ISO20846	8.7		0.41	
1080	D5453	7.5		-0.78	
1081	ISO20846	7.7		-0.58	
1108	D5453	7.3		-0.98	
1109	D5453	8.01		-0.28	
1126	ISO20846	8.3		0.01	
1140	D5453	9.5		1.20	
1146		-----		-----	
1161	ISO20846	8.35		0.06	
1167	D5453	8.40		0.11	
1171	ISO20846	8.02		-0.27	
1175		-----		-----	
1194	D3220	9.4		1.10	
1201	D5453	7.3		-0.98	
1203	ISO20846	8.6		0.31	
1205	D5453	7.62		-0.66	
1215	D5453	10.57		2.26	
1218	ISO20884	8.2		-0.09	
1227	D5453	8.8		0.51	
1231	D5453	13	G(0.01)	4.66	
1251	D5453	7.1		-1.18	
1266	ISO20846	8.87		0.57	
1272	ISO20846	7.2		-1.08	
1281		-----		-----	
1282	inhouse	8.35		0.06	
1296		-----		-----	
1310	ISO2846	7.82		-0.46	
1316	inhouse	16	G(0.01)	7.62	
1318		-----		-----	
1409	D5453	9.0		0.70	
1419	ISO20846	9.21		0.91	
1428	ISO20846	8.4		0.11	
1430		-----		-----	
1512		-----		-----	
1520	D5453	9.66		1.36	
1621	IP531	5	G(0.05)	-3.25	
1634		-----		-----	
1635	D5453	8.0		-0.29	
1636	D5453	8.84		0.55	
1654	ISO20846	9.2		0.90	
1656	IP490	8.5		0.21	
1715		-----		-----	
1720	D5453	7.90		-0.38	
1730	ISO20884	6.4		-1.87	
1740	ISO20846	9.08		0.78	
1810	D5453	8.50		0.21	
1811	D5453	8.64		0.35	
1832	ISO20846	8.49		0.20	
1833	D5453	8.6		0.31	
1842	D2622	7		-1.27	
1849	D5453	8.106		-0.18	
1854	ISO20846	6.6		-1.67	
1861	D5453	10.13		1.82	
1864	ISO20846	8.30		0.01	
1936	ISO20846	8.22		-0.07	
1937	ISO20846	9.34		1.04	
1938	D5453	8.9		0.60	
1939	D5453	8.5		0.21	
1948	ISO20846	9.27		0.97	
8010	D7220	6.3		-1.97	

normality	OK
n	57
outliers	3
mean (n)	8.29
st.dev. (n)	0.862
R(calc.)	2.41
R(D5453:09)	2.83
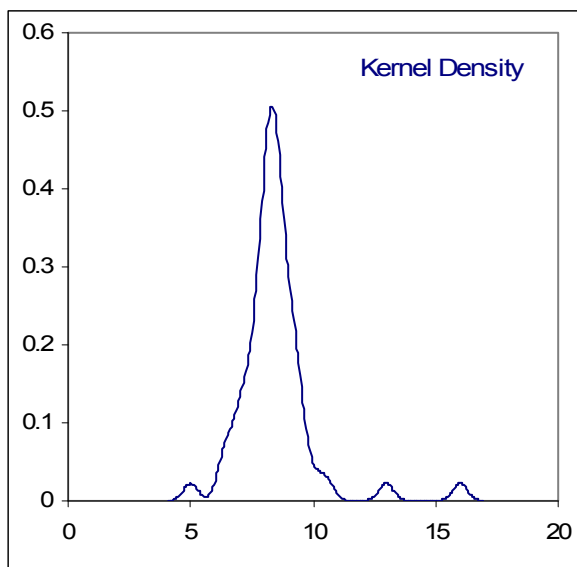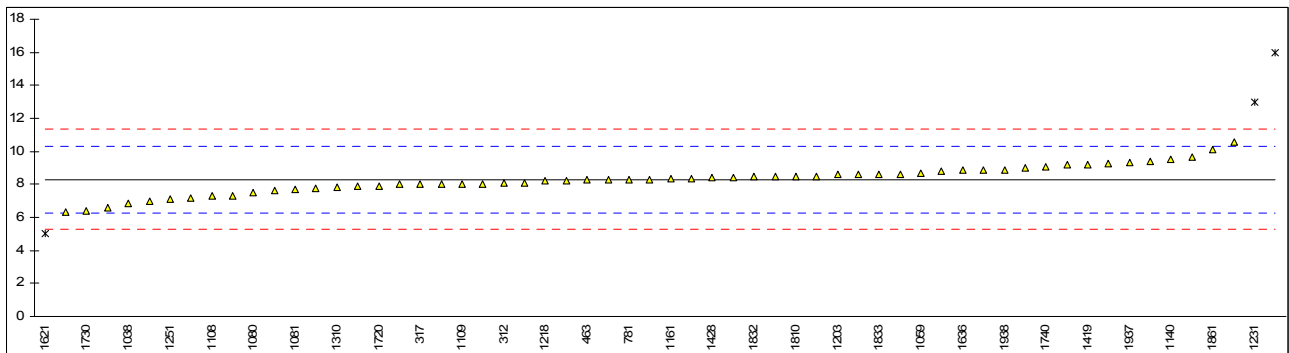
Determination of Total Acid Number (TAN) on sample #1011; result in mgKOH/g

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	D974	0.0044		-1.23	
317		-----		-----	
334		-----		-----	
353	IP177	0.021		-0.07	
430		-----		-----	
463	D974	0.0087		-0.93	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D974	0.0148		-0.50	
1006		-----		-----	
1016		-----		-----	
1017	D974	0.0348		0.90	
1033	D974	0.03		0.56	
1038	D974	0.012		-0.70	
1059	ISO6619	<0.05		-----	
1080	D664	0.02		-0.14	
1081	D664	0.007		-1.05	
1108	D664	0.0196		-0.17	
1109	D974	0.012		-0.70	
1126		-----		-----	
1140	D974	<0.10		-----	
1146	D664	0.0097		-0.86	
1161		-----		-----	
1167		-----		-----	
1171		-----		-----	
1175		-----		-----	
1194		-----		-----	
1201	D974	0.05		1.96	
1203	ISO6618	0.02		-0.14	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D974	0.04		1.26	
1231	D664	0.046		1.68	
1251	D974	0.02		-0.14	
1266		-----		-----	
1272		-----		-----	
1281	ISO6618	0.013		-0.63	
1282		-----		-----	
1296		-----		-----	
1310		-----		-----	
1316	D974	0.015		-0.49	
1318		-----		-----	
1409	D664	0.03		0.56	
1419		-----		-----	
1428	D664	0.017		-0.35	
1430		-----		-----	
1512		-----		-----	
1520	D974	0.025		0.21	
1621		-----		-----	
1634		-----		-----	
1635		-----		-----	
1636		-----		-----	
1654		-----		-----	
1656	IP139	0.013		-0.63	
1715		-----		-----	
1720		-----		-----	
1730		-----		-----	
1740		-----		-----	
1810		-----		-----	
1811		-----		-----	
1832		-----		-----	
1833	D974	0.024		0.14	
1842		-----		-----	
1849		-----		-----	
1854	D974	0.025		0.21	
1861		-----		-----	
1864	D664	0	ex	-1.54	Result excluded, not a real result
1936		-----		-----	
1937		-----		-----	
1938		-----		-----	
1939	D974	0.04		1.26	
1948		-----		-----	
8010		-----		-----	

normality	OK
n	26
outliers	0
mean (n)	0.0220
st.dev. (n)	0.01215
R(calc.)	0.0340
R(D974:08)	0.0400
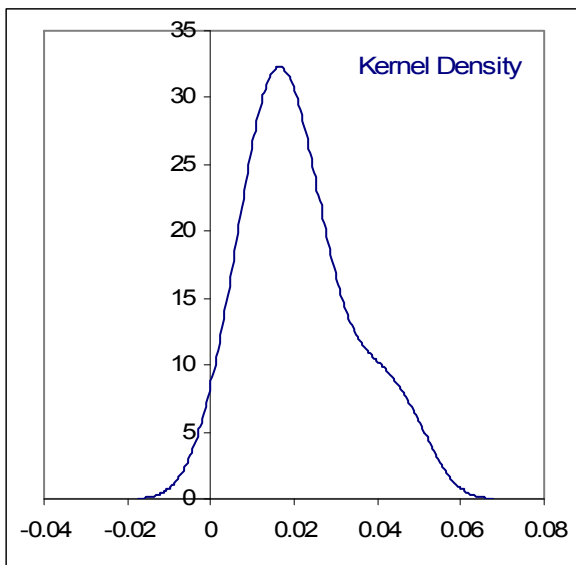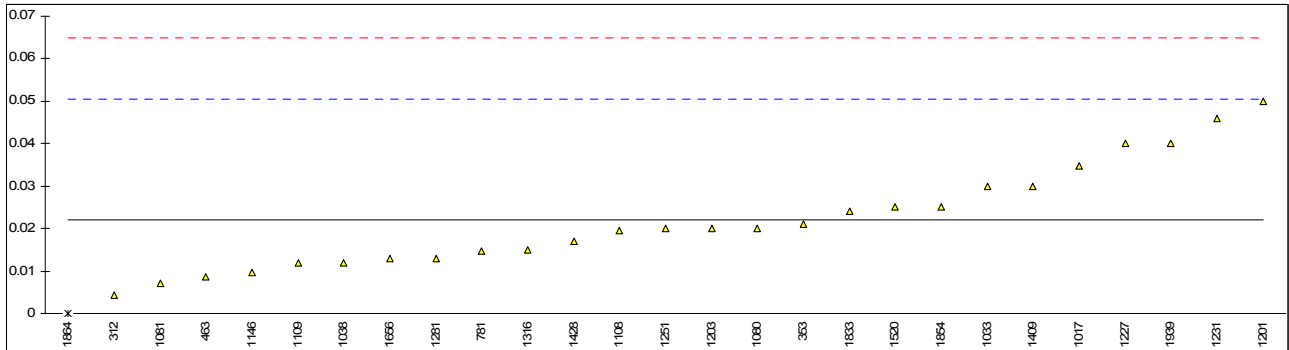
Determination of Water Content on sample #1011; result in mg/kg

lab	method	value	mark	z(targ)	remarks
225		-----		-----	
312	ISO12937-C	70.4		0.18	
317	INH-W/001	60		0.03	
334		-----		-----	
353	IP439-T	71		0.18	
430		-----		-----	
463		-----		-----	
541		-----		-----	
704		-----		-----	
750		-----		-----	
781	D6304-C	47.5		-0.16	
1006	D6304	65.5		0.10	
1016		-----		-----	
1017	ISO12937-C	81.085		0.33	
1033	IP438	52.742		-0.08	
1038		-----		-----	
1059	ISO12937-C	60		0.03	
1080	ISO12937-C	43		-0.22	
1081	D6304	45		-0.19	
1108	D6304-C	66		0.11	
1109	D6304	63.55		0.08	
1126		-----		-----	
1140	IP438-C	49		-0.13	
1146	D6304-C	45		-0.19	
1161	ISO12937-C	87.8655		0.43	
1167	D6304-T	61.86		0.05	
1171	ISO12937-C	51.2		-0.10	
1175		-----		-----	
1194		-----		-----	
1201	D6304-C	55		-0.05	
1203	ISO12937-C	37		-0.31	
1205		-----		-----	
1215		-----		-----	
1218		-----		-----	
1227	D6304-T	55.6		-0.04	
1231	D6304-C	70	C	0.17	First reported 0.007
1251	D6304-C	55		-0.05	
1266		-----		-----	
1272	ISO12937-C	36		-0.32	
1281		-----		-----	
1282		-----		-----	
1296	D6304	51.81		-0.09	
1310	EN12937-C	75		0.24	
1316	D6304-T	38		-0.29	
1318		-----		-----	
1409	ISO12937-C	39		-0.28	
1419	ISO12937-C	64.2		0.09	
1428	ISO12937-C	57.70		-0.01	
1430	D6304-C	69		0.16	
1512	ISO6296-T	70.3		0.17	
1520	D6304-C	54.4		-0.06	
1621	D6304-C	62		0.05	
1634		-----		-----	
1635	ISO12937-C	42.1		-0.23	
1636	D6304-C	74.74		0.24	
1654	D6304-C	65.62		0.11	
1656	IP438-C	81		0.33	
1715	ISO12937-C	47		-0.16	
1720		-----		-----	
1730		-----		-----	
1740	ISO12937-T	60.9		0.04	
1810	D6304-C	100		0.60	
1811	D6304T	110	DG(0.05)	0.75	
1832	ISO12937C	42.8		-0.22	
1833	D6304-T	55.45		-0.04	
1842		-----		-----	
1849	D6304-C	44.68		-0.20	
1854	D6304-C	55		-0.05	
1861	D6304	53.3		-0.07	
1864	ISO12937-C	101.27	DG(0.05)	0.62	
1936	ISO12937-C	58		0.00	
1937	ISO12937-C	63		0.07	
1938	D6304-C	50		-0.12	
1939	KF	230	C,G(0.01)	2.48	First reported 174
1948	ISO12397-T	50.89		-0.11	
8010		-----		-----	

```
normality       OK
n               49
outliers        3
mean (n)        58.3
st.dev. (n)     13.59
R(calc.)        38.1
R(D6304:07)     193.6
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Kernel Density
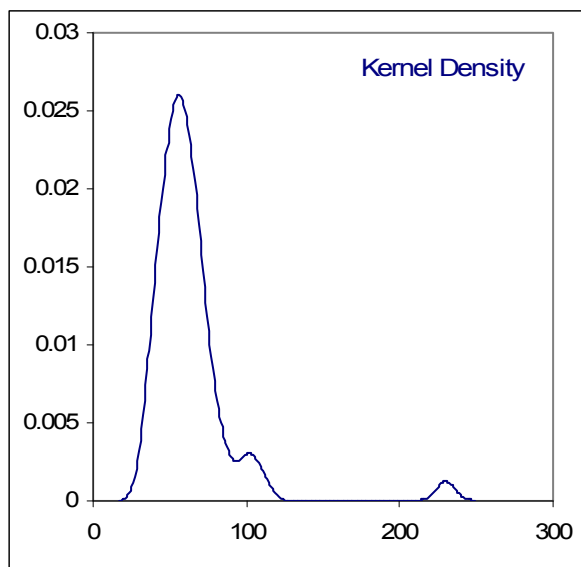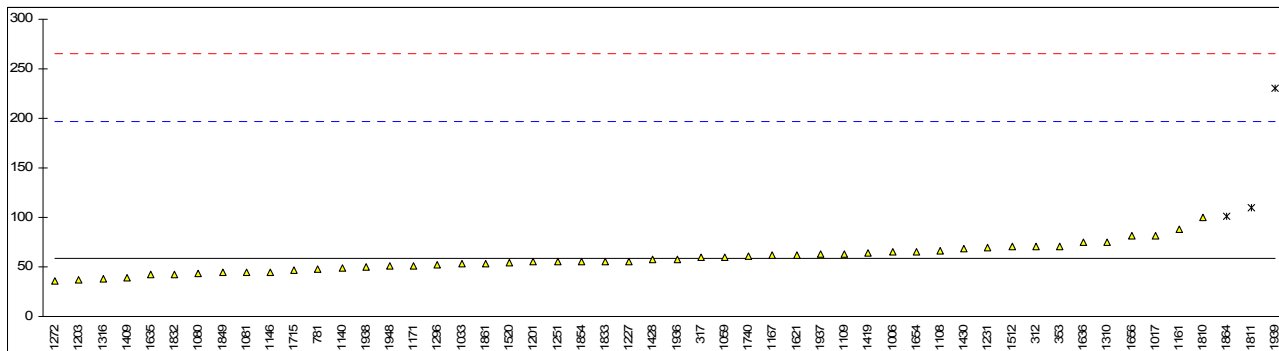
Determination of Distillation (automated) on sample #1011; result in °C

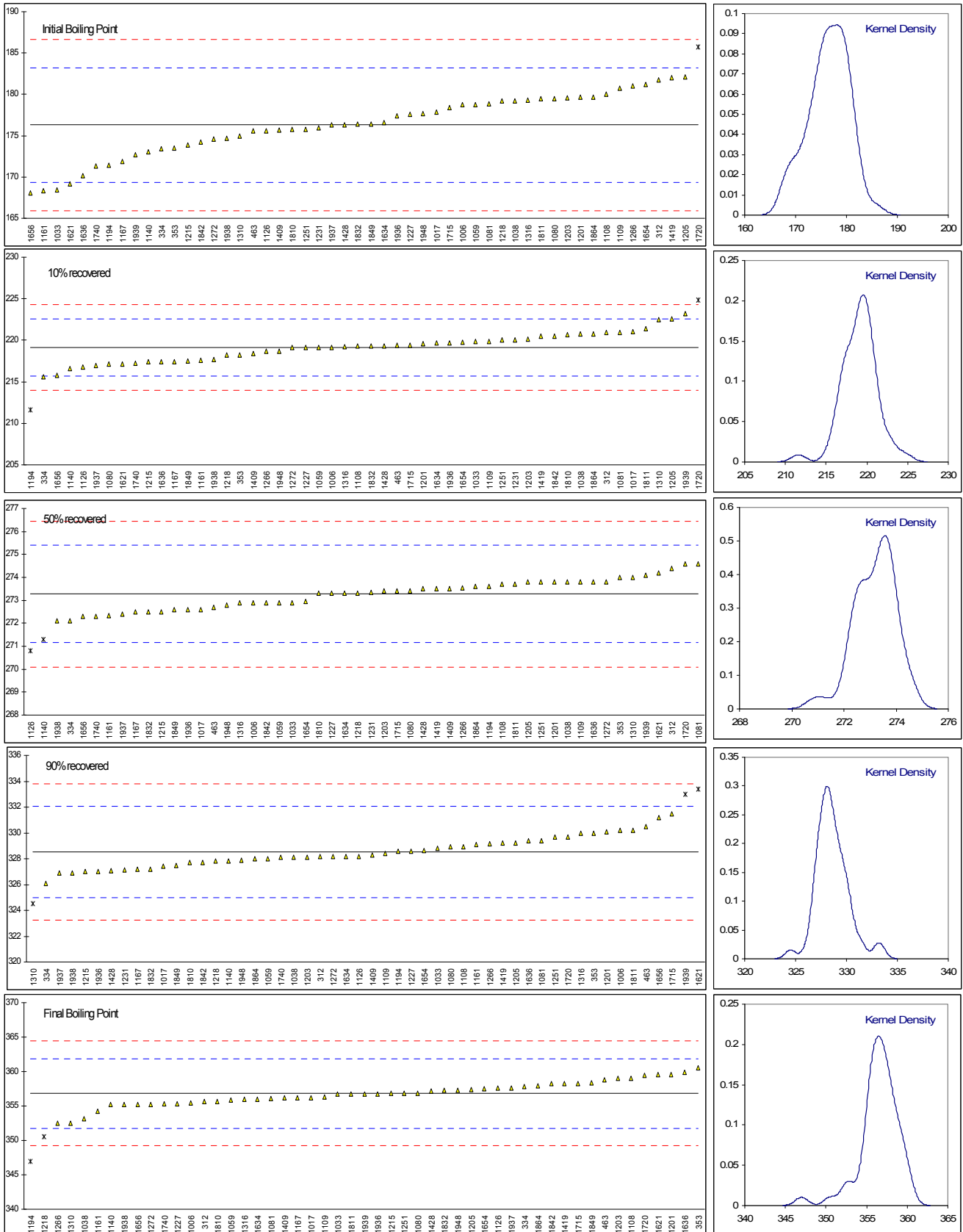| lab	method	IBP	10% rec	50% rec	90% rec	FBP	Vol 250ºC	Vol 350ºC
225		-----	-----	-----	-----	-----	-----	-----
312	D86	181.8	220.9	274.4	328.2	355.6	28.0	96.1
317		-----	-----	-----	-----	-----	-----	-----
334	D86	173.4	215.6	272.1	326.1	357.8	31.4	96.8
353	IP123	173.5	218.2	274.0	330.0	360.5	28.6	95.7
430		-----	-----	-----	-----	-----	-----	-----
463	D86	175.6	219.4	272.7	330.5	358.8	29.4	95.2
541		-----	-----	-----	-----	-----	-----	-----
704		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
781		-----	-----	-----	-----	-----	-----	-----
1006	D86	178.8	219.1	272.9	330.2	355.4	-----	-----
1016		-----	-----	-----	-----	-----	-----	-----
1017	ISO3405	177.9	221.0	272.6	327.4	356.2	29.0	96.1
1033	IP123	168.4	219.9	272.9	328.8	356.7	29.4	96.2
1038	D86	179.2	220.8	273.8	328.1	353.1	-----	-----
1059	ISO3405	178.8	219.1	272.9	328.0	355.9	28.9	96.3
1080	D86	179.5	217.1	273.4	328.9	356.9	29.1	95.8
1081	D86	178.9	220.9	274.6	329.4	356.1	28.5	95.8
1108	D86	180.0	219.3	273.7	328.9	359.0	29.5	95.8
1109	D86	180.8	219.9	273.8	328.4	356.3	28.8	96.0
1126	D86	175.6	216.8	***270.8***	328.2	357.6	31.1	97
1140	D86	173.1	216.6	***271.3***	327.8	355.2	30.9	95.8
1146		-----	-----	-----	-----	-----	-----	-----
1161	ISO3405	168.35	217.55 C	272.35 C	329.10 C	354.25 C	***34.10***	-----
1167	D86	171.9	217.4	272.5	327.2	356.2	30.3	96.7
1171		-----	-----	-----	-----	-----	-----	-----
1175		-----	-----	-----	-----	-----	-----	-----
1194	D86	171.4	***211.6***	273.6	328.6	***347.0***	30.7	-----
1201	D86	179.7	219.6	273.8	330.1	359.6	28.9	95.5
1203	ISO3405	179.6	220.1	273.4	328.1	359.0	29.1	95.9
1205	D86	182.1	222.6	273.8	329.2	357.4	29.0	96.4
1215	D86	173.9	217.4	272.5	327.0	356.8	29.8	96.6
1218	D86	179.2	218.2	273.3	327.8	***350.5***	-----	96.4
1227	D86	177.6	219.1	273.3	328.6	355.3	29.4	96.2
1231	D86	176.00	220.00	273.35	327.15	-----	-----	-----
1251	D86	175.8	220.0	273.8	329.7	356.8	29.1	95.4
1266	ISO3405	181.05	218.70	273.55	329.15	352.45	29.50	96.18
1272	ISO3405	174.6	219.1	273.8	328.2	355.2	28.8	96.2
1281		-----	-----	-----	-----	-----	-----	-----
1282		-----	-----	-----	-----	-----	-----	-----
1296		-----	-----	-----	-----	-----	-----	-----
1310	ISO3405	175 C	222.5	274 C	***324.5***	352.5	32.0	96.5
1316	D86	179.3	219.2	272.9	330.0	356.0	29.1	95.2
1318		-----	-----	-----	-----	-----	-----	-----
1409	D86	175.7	218.4	273.5	328.3	356.2	30.2	96.7
1419	ISO3405	182.0	220.5	273.5	329.2	358.3	29.0	95.6
1428	ISO3405	176.3	219.3	273.5	327.1	357.2	29.1	96.5
1430		-----	-----	-----	-----	-----	-----	-----
1512		-----	-----	-----	-----	-----	-----	-----
1520		-----	-----	-----	-----	-----	-----	-----
1621	D86	169.2	217.1	274.2	***333.4***	359.6	29.2	***94.0***
1634	D86	176.6	219.7	273.3	328.2	356.0	29.4	96.2
1635		-----	-----	-----	-----	-----	-----	-----
1636	D86	170.2	217.4	273.8	329.4	359.9	29.8	95.8
1654	D86	181.20	219.80	272.95	328.65	357.55	29.30	95.90
1656	IP123	168.1	215.8	272.3	331.2	355.2	30.8	94.9
1715	D86	178.4	219.4	273.4	331.5	358.3	29.8	94.5
1720	D86	185.7	***224.8***	274.6	329.7	359.5	28.0	95.7
1730		-----	-----	-----	-----	-----	-----	-----
1740	ISO3405	171.3	217.2	272.3	328.1	355.3	30.4	96.2
1810	D86	175.8	220.7	273.3	327.7	355.6	29.1	96.4
1811	D86	179.5	221.4	273.7	330.2	356.7	28.6	95.0
1832	ISO3405	176.4	219.3	272.5	327.2	357.3	29.1	95.8
1833		-----	-----	-----	-----	-----	-----	-----
1842	D86	174.2	220.5	272.9	327.7	358.3	-----	-----
1849	D86	176.4	217.5	272.6	327.5	358.4	29.8	96.2
1854		-----	-----	-----	-----	-----	-----	-----
1861		-----	-----	-----	-----	-----	-----	-----
1864	ISO3405	179.7	220.8	273.6	328.0	357.9	29.1	96.3
1936	D86	177.4	219.7	272.6	327.0	356.7	30.0	96.5
1937	D86	176.3	217	272.4	326.9	357.6	30.8	96.1
1938	D86	174.7	217.7	272.1	326.9	355.2	30.3	96.4
1939	D86	172.7	223.2	274.1	***333.0***	356.7	28.1	96.1
1948	D86	177.7	218.7	272.8	327.9	357.3	30	96.1
8010		-----	-----	-----	-----	-----	-----	-----

normality	OK	OK	OK	OK	OK	not OK	not OK
n	51	50	50	49	49	46	45
outliers	1	2	2	3	2	1	1
mean (n)	176.29	219.14	273.27	328.51	356.80	29.53	96.02
st.dev. (n)	3.731	1.706	0.654	1.195	1.800	0.889	0.518
R(calc.)	10.45	4.78	1.83	3.35	5.04	2.49	1.45
R(D86:09e1)	9.70	4.82	2.97	4.93	7.10	2.66	2.66

Bold and underlined results are marked as statistical outliers according Grubbs outlier test

Determination of Distillation (manual) on sample #1011; result in °C

lab	method	IBP	10% rec	50% rec	90% rec	FBP	Vol 250ºC	Vol 350ºC
225	D86	178.0	217.0	273.0	330.0	358.0	30.0	95.5
312		-----	-----	-----	-----	-----	-----	-----
317		-----	-----	-----	-----	-----	-----	-----
334		-----	-----	-----	-----	-----	-----	-----
353		-----	-----	-----	-----	-----	-----	-----
430		-----	-----	-----	-----	-----	-----	-----
463		-----	-----	-----	-----	-----	-----	-----
541	D86	172	217	273	330	355	-----	-----
704		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
781	D86	178.0	219.0	275.0	329.0	359.5	28.0	96.0
1006		-----	-----	-----	-----	-----	-----	-----
1016		-----	-----	-----	-----	-----	-----	-----
1017		-----	-----	-----	-----	-----	-----	-----
1033		-----	-----	-----	-----	-----	-----	-----
1038		-----	-----	-----	-----	-----	-----	-----
1059		-----	-----	-----	-----	-----	-----	-----
1080		-----	-----	-----	-----	-----	-----	-----
1081		-----	-----	-----	-----	-----	-----	-----
1108		-----	-----	-----	-----	-----	-----	-----
1109		-----	-----	-----	-----	-----	-----	-----
1126		-----	-----	-----	-----	-----	-----	-----
1140		-----	-----	-----	-----	-----	-----	-----
1146		-----	-----	-----	-----	-----	-----	-----
1161		-----	-----	-----	-----	-----	-----	-----
1167		-----	-----	-----	-----	-----	-----	-----
1171	D86	175.62	215.45	271.81	328.42	353.72	30.95	96.76
1175		-----	-----	-----	-----	-----	-----	-----
1194		-----	-----	-----	-----	-----	-----	-----
1201		-----	-----	-----	-----	-----	-----	-----
1203		-----	-----	-----	-----	-----	-----	-----
1205		-----	-----	-----	-----	-----	-----	-----
1215		-----	-----	-----	-----	-----	-----	-----
1218		-----	-----	-----	-----	-----	-----	-----
1227		-----	-----	-----	-----	-----	-----	-----
1231		-----	-----	-----	-----	-----	-----	-----
1251		-----	-----	-----	-----	-----	-----	-----
1266		-----	-----	-----	-----	-----	-----	-----
1272		-----	-----	-----	-----	-----	-----	-----
1281	ISO3405	181.53	217.61	271.98	329.62	359.43	31.0	95.5
1282		-----	-----	-----	-----	-----	-----	-----
1296		-----	-----	-----	-----	-----	-----	-----
1310		-----	-----	-----	-----	-----	-----	-----
1316		-----	-----	-----	-----	-----	-----	-----
1318		-----	-----	-----	-----	-----	-----	-----
1409		-----	-----	-----	-----	-----	-----	-----
1419		-----	-----	-----	-----	-----	-----	-----
1428		-----	-----	-----	-----	-----	-----	-----
1430		-----	-----	-----	-----	-----	-----	-----
1512		-----	-----	-----	-----	-----	-----	-----
1520	D86	178.0	219.0	273.0	329.0	353.5	28.5	96.0
1621		-----	-----	-----	-----	-----	-----	-----
1634		-----	-----	-----	-----	-----	-----	-----
1635	D86	174.5	_**213.5**_ C	_**269.5**_	_**324.5**_	353.5	32	97
1636		-----	-----	-----	-----	-----	-----	-----
1654		-----	-----	-----	-----	-----	-----	-----
1656		-----	-----	-----	-----	-----	-----	-----
1715		-----	-----	-----	-----	-----	-----	-----
1720		-----	-----	-----	-----	-----	-----	-----
1730		-----	-----	-----	-----	-----	-----	-----
1740		-----	-----	-----	-----	-----	-----	-----
1810		-----	-----	-----	-----	-----	-----	-----
1811		-----	-----	-----	-----	-----	-----	-----
1832		-----	-----	-----	-----	-----	-----	-----
1833	D86	180.9	218.9	273.4	330.0	358.7	29.5	95.5
1842		-----	-----	-----	-----	-----	-----	-----
1849		-----	-----	-----	-----	-----	-----	-----
1854	D86	180	218	273	326.5	360	29	97.5
1861		-----	-----	-----	-----	-----	-----	-----
1864		-----	-----	-----	-----	-----	-----	-----
1936		-----	-----	-----	-----	-----	-----	-----
1937		-----	-----	-----	-----	-----	-----	-----
1938		-----	-----	-----	-----	-----	-----	-----
1939		-----	-----	-----	-----	-----	-----	-----
1948		-----	-----	-----	-----	-----	-----	-----
8010		-----	-----	-----	-----	-----	-----	-----

normality	OK	OK	OK	OK	OK	OK	OK
n	9	8	8	8	9	8	8
outliers	0	1	1	1	0	0	0
mean (n)	177.62	217.75	273.02	329.07	356.82	29.87	96.22
st.dev. (n)	3.112	1.250	0.972	1.191	2.828	1.377	0.774
R(calc.)	8.71	3.50	2.72	3.34	7.92	3.85	2.17
R(D86:09e1)	6.53	4.37	3.66	4.03	4.27	4.18	4.18

Bold and underlined results are marked as statistical outliers according Grubbs outlier test
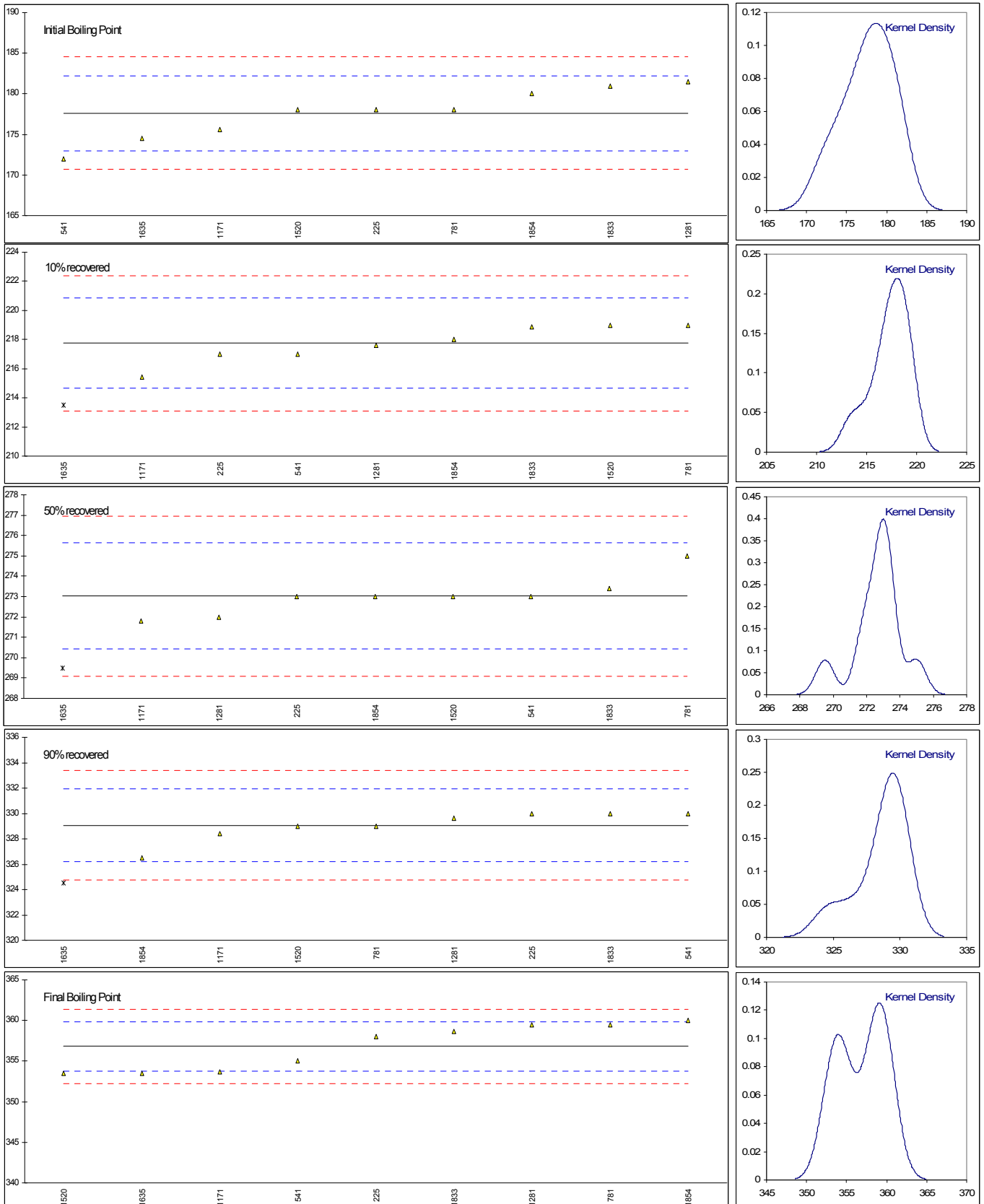
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Determination of Total Contamination on sample #1012; result in mg/kg

lab	method	value	mark	z(targ)	Volume used in mL	remarks
312	EN12662	16.75		-2.64	800	
334	EN12662	3.6	ex	-7.89	800	Manually excluded, see §4.1
353	IP440	26.329		1.19	500	Reported blocked filter
463	D6217	21.904		-0.58	995	
1059	EN12662	25.0		0.66	800	
1080	EN12662	21.1		-0.90	--	
1081	D5772	11	ex	-4.94	--	Manually excluded, see §4.1
1095	EN12662	6.4	ex	-6.78	800	Manually excluded, see §4.1
1108	EN12662	9.2	ex	-5.66	300	Manually excluded, see §4.1
1161	EN12662	4.1	ex,C	-7.69	800	Manually excluded, see §4.1, First reported 5.39
1167	EN12662	29.50		2.46	800	Manually excluded, see §4.1
1203	EN12662	22.9		-0.18	800	
1251	EN12662	17		-2.54	400	
1272	EN12662	25.99		1.05	2*500	
1409	EN12662	16.1		-2.90	800	
1419	EN12662	25.5		0.86	800	
1428	EN12662	22.8		-0.22	800	
1520	EN12662	25.59		0.90	800	
1833	EN12662	5.1824	C,ex	-7.26	800	Manually excluded, see §4.1, first reported 2.8487
1854	EN12662	30		2.66	300	
1936	EN12662	22.0	C	-0.54	800	First reported 11.0
1937	EN12662	23.5	C	0.06	800	First reported 10.0
1938	EN12662	25.0	C	0.66	800	First reported 10.3
1948	EN12662	4.2	ex	-7.65	--	Manually excluded, see §4.1

normality	OK			
n	17			
outliers	0	Spike		
mean (n)	23.35	20.8		< 112% recovered
st.dev. (n)	4.023			
R(calc.)	11.26			
R(EN12662:08)	7.01			

Kernel Density
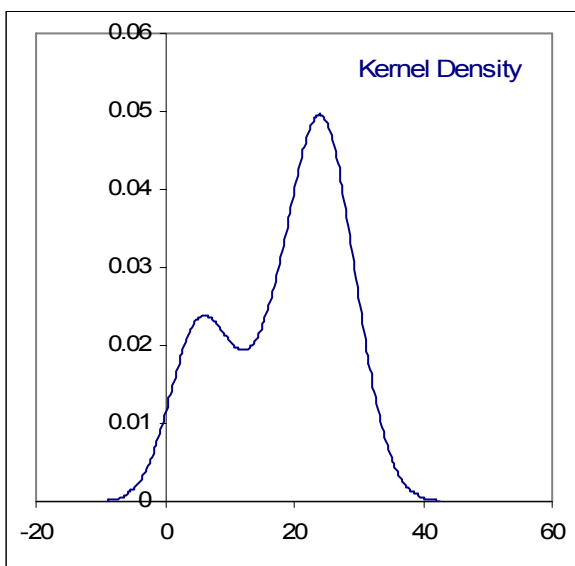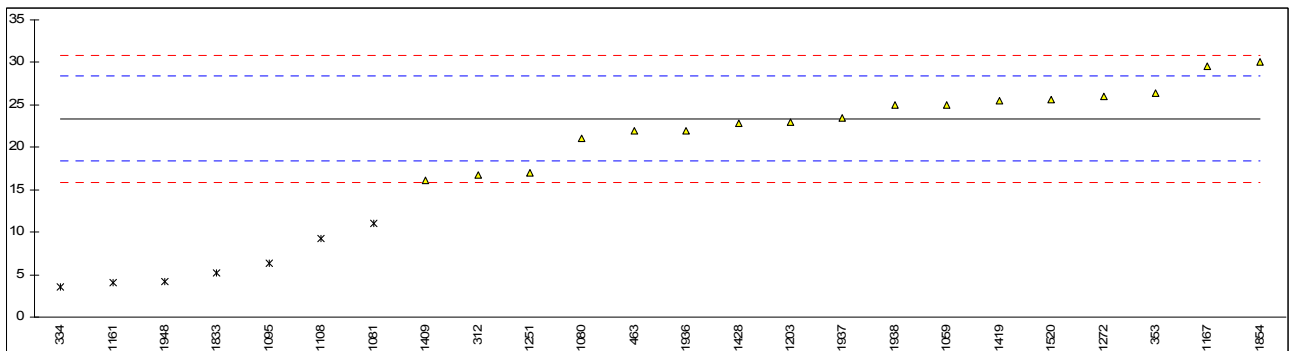
APPENDIX 2
Z-scores Distillation (Automated)

lab	method	IBP	10% rec	50% rec	90% rec	FBP	Vol 250ºC	Vol 350ºC
225		-----	-----	-----	-----	-----	-----	-----
312	D86	1.59	1.02	1.06	-0.18	-0.47	-1.61	0.09
317		-----	-----	-----	-----	-----	-----	-----
334	D86	-0.83	-2.06	-1.11	-1.37	0.39	1.97	0.83
353	IP123	-0.80	-0.55	0.68	0.84	1.46	-0.97	-0.33
430		-----	-----	-----	-----	-----	-----	-----
463	D86	-0.20	0.15	-0.54	1.13	0.79	-0.13	-0.86
541		-----	-----	-----	-----	-----	-----	-----
704		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
781		-----	-----	-----	-----	-----	-----	-----
1006	D86	0.73	-0.02	-0.35	0.96	-0.55	-----	-----
1016		-----	-----	-----	-----	-----	-----	-----
1017	ISO3405	0.47	1.08	-0.64	-0.63	-0.24	-0.55	0.09
1033	IP123	-2.28	0.44	-0.35	0.16	-0.04	-0.13	0.19
1038	D86	0.84	0.96	0.50	-0.23	-1.46	-----	-----
1059	ISO3405	0.73	-0.02	-0.35	-0.29	-0.36	-0.66	0.30
1080	D86	0.93	-1.19	0.12	0.22	0.04	-0.45	-0.23
1081	D86	0.75	1.02	1.25	0.50	-0.28	-1.08	-0.23
1108	D86	1.07	0.09	0.40	0.22	0.87	-0.03	-0.23
1109	D86	1.30	0.44	0.50	-0.06	-0.20	-0.76	-0.02
1126	D86	-0.20	-1.36	-2.33	-0.18	0.31	1.66	1.04
1140	D86	-0.92	-1.48	-1.86	-0.41	-0.63	1.45	-0.23
1146		-----	-----	-----	-----	-----	-----	-----
1161	ISO3405	-2.29	-0.93	-0.87	0.33	-1.01	4.81	-----
1167	D86	-1.27	-1.01	-0.73	-0.75	-0.24	0.81	0.72
1171		-----	-----	-----	-----	-----	-----	-----
1175		-----	-----	-----	-----	-----	-----	-----
1194	D86	-1.41	-4.38	0.31	0.05	-3.87	1.24	-----
1201	D86	0.99	0.27	0.50	0.90	1.10	-0.66	-0.54
1203	ISO3405	0.96	0.56	0.12	-0.23	0.87	-0.45	-0.12
1205	D86	1.68	2.01	0.50	0.39	0.24	-0.55	0.41
1215	D86	-0.69	-1.01	-0.73	-0.86	0.00	0.29	0.62
1218	D86	0.84	-0.55	0.02	-0.41	-2.49	-----	0.41
1227	D86	0.38	-0.02	0.02	0.05	-0.59	-0.13	0.19
1231	D86	-0.08	0.50	0.07	-0.77	-----	-----	-----
1251	D86	-0.14	0.50	0.50	0.67	0.00	-0.45	-0.65
1266	ISO3405	1.38	-0.26	0.26	0.36	-1.72	-0.03	0.17
1272	ISO3405	-0.49	-0.02	0.50	-0.18	-0.63	-0.76	0.19
1281		-----	-----	-----	-----	-----	-----	-----
1282		-----	-----	-----	-----	-----	-----	-----
1296		-----	-----	-----	-----	-----	-----	-----
1310	ISO3405	-0.37	1.95	0.68	-2.28	-1.70	2.60	0.51
1316	D86	0.87	0.03	-0.35	0.84	-0.32	-0.45	-0.86
1318		-----	-----	-----	-----	-----	-----	-----
1409	D86	-0.17	-0.43	0.21	-0.12	-0.24	0.71	0.72
1419	ISO3405	1.65	0.79	0.21	0.39	0.59	-0.55	-0.44
1428	ISO3405	0.00	0.09	0.21	-0.80	0.16	-0.45	0.51
1430		-----	-----	-----	-----	-----	-----	-----
1512		-----	-----	-----	-----	-----	-----	-----
1520		-----	-----	-----	-----	-----	-----	-----
1621	D86	-2.05	-1.19	0.87	2.78	1.10	-0.34	-2.12
1634	D86	0.09	0.32	0.02	-0.18	-0.32	-0.13	0.19
1635		-----	-----	-----	-----	-----	-----	-----
1636	D86	-1.76	-1.01	0.50	0.50	1.22	0.29	-0.23
1654	D86	1.42	0.38	-0.31	0.08	0.29	-0.24	-0.12
1656	IP123	-2.36	-1.94	-0.92	1.53	-0.63	1.34	-1.17
1715	D86	0.61	0.15	0.12	1.70	0.59	0.29	-1.59
1720	D86	2.72	3.29	1.25	0.67	1.06	-1.61	-0.33
1730		-----	-----	-----	-----	-----	-----	-----
1740	ISO3405	-1.44	-1.13	-0.92	-0.23	-0.59	0.92	0.19
1810	D86	-0.14	0.90	0.02	-0.46	-0.47	-0.45	0.41
1811	D86	0.93	1.31	0.40	0.96	-0.04	-0.97	-1.07
1832	ISO3405	0.03	0.09	-0.73	-0.75	0.20	-0.45	-0.23
1833		-----	-----	-----	-----	-----	-----	-----
1842	D86	-0.60	0.79	-0.35	-0.46	0.59	-----	-----
1849	D86	0.03	-0.95	-0.64	-0.58	0.63	0.29	0.19
1854		-----	-----	-----	-----	-----	-----	-----
1861		-----	-----	-----	-----	-----	-----	-----
1864	ISO3405	0.99	0.96	0.31	-0.29	0.43	-0.45	0.30
1936	D86	0.32	0.32	-0.64	-0.86	-0.04	0.50	0.51
1937	D86	0.00	-1.24	-0.82	-0.92	0.31	1.34	0.09
1938	D86	-0.46	-0.84	-1.11	-0.92	-0.63	0.81	0.41
1939	D86	-1.04	2.36	0.78	2.55	-0.04	-1.50	0.09
1948	D86	0.41	-0.26	-0.45	-0.35	0.20	0.50	0.09
8010		-----	-----	-----	-----	-----	-----	-----

Z-scores Distillation (Manual)

lab	method	IBP	10% rec	50% rec	90% rec	FBP	Vol 250ºC	Vol 350ºC
225	D86	0.16	-0.48	-0.02	0.65	0.78	0.09	-0.48
312		-----	-----	-----	-----	-----	-----	-----
317		-----	-----	-----	-----	-----	-----	-----
334		-----	-----	-----	-----	-----	-----	-----
353		-----	-----	-----	-----	-----	-----	-----
430		-----	-----	-----	-----	-----	-----	-----
463		-----	-----	-----	-----	-----	-----	-----
541	D86	-2.41	-0.48	-0.02	0.65	-1.19	-----	-----
704		-----	-----	-----	-----	-----	-----	-----
750		-----	-----	-----	-----	-----	-----	-----
781	D86	0.16	0.81	1.52	-0.05	1.76	-1.25	-0.15
1006		-----	-----	-----	-----	-----	-----	-----
1016		-----	-----	-----	-----	-----	-----	-----
1017		-----	-----	-----	-----	-----	-----	-----
1033		-----	-----	-----	-----	-----	-----	-----
1038		-----	-----	-----	-----	-----	-----	-----
1059		-----	-----	-----	-----	-----	-----	-----
1080		-----	-----	-----	-----	-----	-----	-----
1081		-----	-----	-----	-----	-----	-----	-----
1108		-----	-----	-----	-----	-----	-----	-----
1109		-----	-----	-----	-----	-----	-----	-----
1126		-----	-----	-----	-----	-----	-----	-----
1140		-----	-----	-----	-----	-----	-----	-----
1146		-----	-----	-----	-----	-----	-----	-----
1161		-----	-----	-----	-----	-----	-----	-----
1167		-----	-----	-----	-----	-----	-----	-----
1171	D86	-0.86	-1.48	-0.93	-0.45	-2.03	0.72	0.36
1175		-----	-----	-----	-----	-----	-----	-----
1194		-----	-----	-----	-----	-----	-----	-----
1201		-----	-----	-----	-----	-----	-----	-----
1203		-----	-----	-----	-----	-----	-----	-----
1205		-----	-----	-----	-----	-----	-----	-----
1215		-----	-----	-----	-----	-----	-----	-----
1218		-----	-----	-----	-----	-----	-----	-----
1227		-----	-----	-----	-----	-----	-----	-----
1231		-----	-----	-----	-----	-----	-----	-----
1251		-----	-----	-----	-----	-----	-----	-----
1266		-----	-----	-----	-----	-----	-----	-----
1272		-----	-----	-----	-----	-----	-----	-----
1281	ISO3405	1.68	-0.09	-0.80	0.38	1.72	0.76	-0.48
1282		-----	-----	-----	-----	-----	-----	-----
1296		-----	-----	-----	-----	-----	-----	-----
1310		-----	-----	-----	-----	-----	-----	-----
1316		-----	-----	-----	-----	-----	-----	-----
1318		-----	-----	-----	-----	-----	-----	-----
1409		-----	-----	-----	-----	-----	-----	-----
1419		-----	-----	-----	-----	-----	-----	-----
1428		-----	-----	-----	-----	-----	-----	-----
1430		-----	-----	-----	-----	-----	-----	-----
1512		-----	-----	-----	-----	-----	-----	-----
1520	D86	0.16	0.81	-0.02	-0.05	-2.18	-0.92	-0.15
1621		-----	-----	-----	-----	-----	-----	-----
1634		-----	-----	-----	-----	-----	-----	-----
1635	D86	-1.34	-2.74	-2.70	-3.17	-2.18	1.43	0.52
1636		-----	-----	-----	-----	-----	-----	-----
1654		-----	-----	-----	-----	-----	-----	-----
1656		-----	-----	-----	-----	-----	-----	-----
1715		-----	-----	-----	-----	-----	-----	-----
1720		-----	-----	-----	-----	-----	-----	-----
1730		-----	-----	-----	-----	-----	-----	-----
1740		-----	-----	-----	-----	-----	-----	-----
1810		-----	-----	-----	-----	-----	-----	-----
1811		-----	-----	-----	-----	-----	-----	-----
1832		-----	-----	-----	-----	-----	-----	-----
1833	D86	1.41	0.75	0.29	0.65	1.24	-0.25	-0.48
1842		-----	-----	-----	-----	-----	-----	-----
1849		-----	-----	-----	-----	-----	-----	-----
1854	D86	1.02	0.16	-0.02	-1.78	2.09	-0.58	0.86
1861		-----	-----	-----	-----	-----	-----	-----
1864		-----	-----	-----	-----	-----	-----	-----
1936		-----	-----	-----	-----	-----	-----	-----
1937		-----	-----	-----	-----	-----	-----	-----
1938		-----	-----	-----	-----	-----	-----	-----
1939		-----	-----	-----	-----	-----	-----	-----
1948		IBP	10% rec	50% rec	90% rec	FBP	Vol 250ºC	Vol 350ºC
8010		-----	-----	-----	-----	-----	-----	-----

APPENDIX 3

Participants per country

1 laboratory in	ARGENTINA
2 laboratories in	AUSTRALIA
1 laboratory in	AUSTRIA
4 laboratories in	BELGIUM
1 laboratory in	BOSNIA and HERZEGOVINA
1 laboratory in	CÔTE D'IVOIRE
1 laboratory in	CROATIA
1 laboratory in	CYPRUS
2 laboratories in	CZECH REPUBLIC
3 laboratories in	ESTONIA
1 laboratory in	FRANCE
6 laboratories in	GREECE
3 laboratories in	HUNGARY
1 laboratory in	INDIA
2 laboratories in	IRELAND
1 laboratory in	LATVIA
1 laboratory in	NORWAY
1 laboratory in	PORTUGAL
1 laboratory in	REPUBLIC OF MACEDONIA
2 laboratories in	RUSSIA
1 laboratory in	SERBIA
1 laboratory in	SLOVAK REPUBLIC
1 laboratory in	SLOVENIA
2 laboratories in	SOUTH KOREA
2 laboratories in	SPAIN
1 laboratory in	SUDAN
2 laboratories in	SWEDEN
1 laboratory in	TAIWAN R.O.C.
2 laboratories in	THAILAND
8 laboratories in	THE NETHERLANDS
11 laboratories in	TURKEY
1 laboratory in	U.A.E.
1 laboratory in	UKRAINE
5 laboratories in	UNITED KINGDOM

APPENDIX 4

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
ex	= excluded from calculations
E	= probably error in calculations
U	= probably reported in different unit
n.a.	= not applicable
fr.	= first reported
Rep./R	= reported
W	= withdrawn on request of the participant

Literature:

1   iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, January 2010
2   ASTM E178-02
3   ASTM E1301-03
4   ISO 5725-86
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6   ISO 13528-05
7   M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
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11   P.L. Davies, Fr. 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 page1359-1364, P.J. Lowthian and M. Thompson. (see http://www.rsc.org/suppdata/an/b2/b2#10110n/)