Results of Proficiency Test
Biogasoline E10
May 2012

Organised by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1   INTRODUCTION

Since 2009, the Institute for Interlaboratory Studies organizes every year a proficiency test for the analysis of Biogasoline E10. During the annual proficiency testing program 2011/2012, it was decided to continue the round robin for the analysis of Biogasoline E10. In this interlaboratory study, 43 laboratories in 18 different countries have participated. See appendix 3 for the number of participants per country. In this report, the results of the Biogasoline E10 proficiency test are presented and discussed.

2   SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organiser of this proficiency test. The sample analyses for fit-for-use and homogeneity testing were subcontracted. In this proficiency test, the participants received, depending on their registration, two or three samples of Biogasoline E10: 2*1 litre (labelled #12070) and/or 1*1 litre (± 800 mL filled, labelled #12071 for DVPE only).
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 accordance with EN/ISO17043:2010 and ILAC-G13:2007, (R007), since January 2000, by the Dutch Accreditation Council: RvA (Raad voor Accreditatie). This ensures strict adherence to protocols for sample preparation and statistical evaluation and 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 organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organization, 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 necessary sample material of about 200 litres of Biogasoline E5 was purchased at a local pump station. To 190 litre of the bulk material 10 litre of Fuel-Ethanol was added to increase the Ethanol content up to 10%. After homogenisation, the material was transferred into 128 brown glass bottles of 1 litre (labelled #12070). And another 68 brown glass bottles of 1 litre were filled for approx. 800 mL for Dry Vapour Pressure Equivalent only (labelled #12071).

The homogeneity of the subsamples #12070 was checked by determination of Density @15°C in accordance with ASTM D4052 on 7 stratified randomly selected samples.

The homogeneity of the subsamples #12071 was checked by determination of Dry Vapour Pressure Equivalent in accordance with ASTM D5191:10b on 8 stratified randomly selected samples.

	Density @ 15°C in kg/m^3
Sample #12070-1	733.60
Sample #12070-2	733.57
Sample #12070-3	733.65
Sample #12070-4	733.56
Sample #12070-5	733.56
Sample #12070-6	733.68
Sample #12070-7	733.63

table 1: homogeneity test results of subsamples #12070

	DVPE in psi
Sample #12071-1	13.59
Sample #12071-2	13.59
Sample #12071-3	13.60
Sample #12071-4	13.57
Sample #12071-5	13.59
Sample #12071-6	13.57
Sample #12071-7	13.57
Sample #12071-8	13.60

table 2: homogeneity test results of subsamples #12071

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 @ 15°C in kg/m^3	DVPE in psi
r (sample #12070)	0.14	--
r (sample #12071)	--	0.04
reference test	ISO12185:96	ASTM D5191:10b
0.3*R (Reference)	0.15	0.11

table 3: repeatabilities of the subsamples #12070 and #12071

The calculated repeatabilities were less than 0.3 times the reproducibility of the corresponding reference method. Therefore, homogeneity of the subsamples #12070 and #12071 was assumed.

To the participants, depending on their registration, 2*1 litre of sample #12070 and/or 1*1 litre (± 800 mL filled) of sample #12071 were sent on May 2, 2012.

2.5 ANALYSIS

The participants were requested to determine on sample #12070: Aromatics (FIA & GC), API gravity, Benzene, Copper Strip Corrosion 3hrs/50°C, Density @ 15°C, Distillation, Doctor test, Ethanol, Existent Gum, Lead, Manganese, Mercaptans , Olefins (FIA & GC), Oxidation Stability, Oxygen, Sulphur, RON and MON. On sample #12071 the participants were requested to determine TVP and to calculate DVPE only (in accordance with ASTM D5191 and EPA requirements).

To get comparable results a detailed report form, on which the units were prescribed as well as some of the required standards and a letter of instructions were prepared and made available for download on the iis website. A SDS and a form to confirm receipt of the samples were added to the sample package.

3 RESULTS

During four weeks after sample despatch, the results of the individual laboratories were gathered. The original data are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.

Directly after the deadline, a reminder fax was sent to the laboratories that had not reported results at that moment. Shortly after the deadline, the available results were screened for suspect data. A result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the results. Additional or corrected results are used for data analysis and original results are placed under 'Remarks' in the result tables in appendix 1.

3.1 STATISTICS

Statistical calculations were performed as described in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' 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 statistical evaluation of the results should be used with due care.

In accordance to 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.

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

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

3.2 GRAPHICS

In order to visualize the data against the reproducibilities from literature, Gauss plots were made, using the sorted data for one determination (see appendix 1). On the Y-axis the reported 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 "x". 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.14 and 15).

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. The target standard deviation was calculated from the literature reproducibility by division with 2.8.
When a laboratory did use a test method with a reproducibility that is significantly different from the reproducibility of the reference test method used in this report, it is strongly advised to recalculate the z-score, while using the reproducibility of the actual test method used this in order to evaluate the fit-for-useness of the reported test result.
The z-scores were calculated in accordance with:

$z_{(target)}$ = (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 proficiency test, no problems were encountered during the dispatch of the samples to the participants.

Five laboratories reported the test results after the final reporting date and three laboratories did not report any result at all. Not all laboratories were able to perform all analyses requested. Finally, 40 laboratories did report 831 numerical results. Observed were 30 outlying results, which is 3.6%. In proficiency tests, outlier percentages of 3% - 7.5% are quite normal.

4.1   EVALUATION PER TEST

In this section, the results are discussed per test. Not all data sets proved to have a normal distribution. Not normal Gaussians distributions were found for the following determinations: Benzene, Density, Ethanol, Distillation (90% evaporated, volume @150°C), Existent gum and Mercaptanes. In these cases, the statistical evaluation should be used with care.

Aromatics by FIA: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in full agreement with the requirements of ASTM D1319:10. It must be noted that ASTM D1319 is no longer part of EN238 or ASTM D4814.

Aromatics by GC: This determination was not problematic. Only one statistical outlier was observed and the calculated reproducibility is in agreement with the requirements of EN14517:04 or ISO22854:08.

API gravity: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of ASTM D1298:05.

Benzene: This determination was problematic. Five (!) statistical outliers were observed. The calculated reproducibility, after rejection of the statistical outliers, is not in agreement with the requirements of EN14517:04 or ISO22854:08.

Copper strip: No problems have been observed, all reporting participants agreed on a test result of 1(1A).

Density @15°C: This determination is not problematic. Three statistical outliers were observed. However, the calculated reproducibility, after rejection of the statistical outliers, is in full agreement with the requirements of ISO12185:96.

Distillation: This determination was not problematic. In total ten statistical outliers were observed. However, all calculated reproducibilities after rejection of the statistical outliers are in good agreement with the requirements of ISO3405:11 (Automated), except for 50% evaporated.

Doctor test: No problems have been observed, all reporting participants agreed on a test result of "negative".

Ethanol: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in good agreement with the requirements of EN14517:04, but not with the requirements of ISO13132:00.

Existent Gum   This determination may be problematic at this low level of 0.55 mg/100mL (near or below the limit of detection). One statistical outlier was observed.
.
Lead: The consensus value of the group is below the application range (2.5 - 25 mg/L) and all participants, except one, reported a "less then" result. Therefore, no significant conclusions were drawn.

Manganese: Only three participants reported a numerical result and eight participants reported a "less then" result. Therefore, no significant conclusions were drawn.

Mercaptans: This determination was not problematic at this low concentration level. The application range is 0.0003 – 0.01 %M/M. Four participants reported a less than result. No statistical outliers were observed. The calculated reproducibility is in agreement with the requirements ASTM D3227:10.

Olefins by FIA: This determination was not problematic. Only one statistical outlier was observed and the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of ASTM D1319:10.

Olefins by GC: This determination was not problematic. Only one statistical outlier was observed and the calculated reproducibility after rejection of the statistical outlier is in good agreement with the requirements of EN14517:04.

Oxidation stab.: In this determination no problems had been observed. All reporting participants agreed on a result above 360 minutes.

Oxygen: This determination was not problematic. No statistical outliers were observed and the calculated reproducibility is in full agreement with the requirements of EN14517:05.

Sulphur: This determination was problematic. Only one statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ISO20846:04. When the ISO20846 data were evaluated separately, the calculated reproducibility is smaller but still not in agreement with the standard.

RON: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection is of the statistical outliers is in agreement with ISO5164:02.

MON: This determination was problematic. Only one statistical outlier was observed. However, the calculated reproducibility after rejection of the statistical outlier is not in agreement with the requirements of ISO5163:02.

TVP: This determination was not problematic. Two statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in good agreement with the requirements of ASTM D5191:10b.

DVPE: The conversion of the measured Total Vapour Pressure to the corresponding Dry Vapour Pressure Equivalent (DVPE) as described in the ASTM D5191:10b and the U.S. EPA guidelines (40 CFR Part 80, App. E, Method 3), showed in total two statistical outliers. Both calculated reproducibilities after rejection of the statistical outliers are in agreement with the requirement of ASTM D5191:10b.
                Calculation errors were observed in the conversion calculations for laboratory 1134.

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. The assigned values, calculated reproducibilities and reproducibilities, derived from literature standards (in casu ASTM, ISO, EN standards) are compared in the next table.

Parameter	unit	n	average	2.8 * sd	R (lit)
Aromatics (FIA)	%V/V	22	27.32	3.95	3.70
Aromatics (GC)	%V/V	22	25.69	1.15	1.29
API gravity		20	61.27	0.23	0.30
Benzene	%V/V	29	0.66	0.06	0.04
Copper Strip 3 hrs @ 50°C	-----	33	1(1A)	n.a.	n.a.
Density @ 15°C	kg/m^3	38	733.82	0.49	0.50
Initial Boiling Point	ºC	39	28.56	4.70	4.75
10% evaporated	ºC	40	42.00	3.13	3.20
50% evaporated	ºC	39	67.99	2.44	1.88
90% evaporated	ºC	36	143.23	1.62	3.86
Final Boiling Point	ºC	38	179.19	6.06	6.78
%Vol @70ºC	%V/V	35	51.93	2.62	2.70
%Vol @100ºC	%V/V	36	62.40	2.04	2.20
%Vol @150ºC	%V/V	34	93.06	0.98	1.30
Doctor test		23	negative	n.a.	n.a.
Ethanol	%V/V	34	9.16	1.06	1.59
Existent Gum (washed)	mg/100mL	18	0.55	1.07	0.58
Mercaptans as S	%M/M	18	0.0002	0.0002	0.0003
Olefins (FIA)	%V/V	22	11.74	2.20	3.59
Olefins (GC)	%V/V	17	12.10	0.95	1.94
Oxidation Stability	minutes	15	>900	n.a.	n.a.
Oxygen content	% M/M	30	3.70	0.45	0.44
Sulphur	mg/kg	34	5.85	2.56	1.78
RON	-----	24	97.34	0.54	0.70
MON	-----	23	85.70	1.09	0.90

table 4: performance evaluation sample #12070

Parameter	unit	n	average	2.8 * sd	R (lit)
TVP acc.to ASTM D5191	psi	28	14.42	0.40	0.38
DVPE acc.to ASTM D5191	psi	34	13.36	0.35	0.37
DVPE acc.to EPA	psi	26	13.45	0.38	0.37

table 5: performance evaluation sample #12071

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

4.3   COMPARISON OF THE PROFICIENCY TEST OF MAY 2012 WITH PREVIOUS PT

Determination	May 2012	May 2011	May 2010	April 2009
Number of reporting labs	40	34	30	50
Number of results reported	831	642	664	1125
Statistical outliers	30	21	47	41
Percentage outliers	3.6%	3.3%	7.1%	4.0%

table 6: 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:

Determination	May 2012	May 2011	May 2010	April 2009
Aromatics by FIA	+/-	--	--	--
Aromatics by GC	+	++	++	++
API gravity	+	++	++	n.e.
Benzene	-	+	--	+
Density @ 15°C	+/-	-	+/-	--
Distillation	+	+	++	+
Ethanol	++	++	+/-	+
Existent Gum (washed)	--	n.a	--	++
Mercaptans as S	++	++	++	++
Olefins by FIA	++	--	--	n.e.
Olefins by GC	++	++	++	++
Oxidation Stability	n.e.	n.e.	n.e.	n.e.
Oxygen	+/-	--	++	+
Sulphur	-	-	+/-	++
RON	+	+/-	++	+/-
MON	-	--	--	++
TVP acc.to ASTM D5191	+/-	--	++	n.e.
DVPE acc.to ASTM D5191	+/-	-	++	--
DVPE acc.to EPA	+/-	-	++	--

table 7: comparison of the quality of the various determinations against the respective standard requirements

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

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

APPENDIX 1

Determination of Aromatics by FIA on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D1319	29.4		1.57	
120	D1319	27.55		0.17	
132	D1319	26.70		-0.47	
150	D1319	27.0		-0.25	
158	D1319	23.7		-2.74	
159	D1319	27.6		0.21	
169	D1319	28.3		0.74	
171	D1319	25.0		-1.76	
193		-----		-----	
311	D1319	26.7		-0.47	
312	D1319	28.2		0.66	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343	D1319	27.9		0.44	
447	D1319	26.3		-0.77	
463		-----		-----	
494		-----		-----	
495		-----		-----	
496	D1319	28.1		0.59	
631	D1319	27.91		0.44	
862	D1319	26.57		-0.57	
1006	D6293	25.8	ex	-1.15	Result excluded, method is by GC
1026	D6729	27.7	ex	0.28	Result excluded, method is by GC
1033	IP156	28.1		0.59	
1047	D1319	28.3		0.74	
1131		-----		-----	
1134		-----		-----	
1140	D1319	27.6		0.21	
1203	D1319	30.3		2.25	
1299	D1319	27.2		-0.09	
1346		-----		-----	
1459		-----		-----	
1538	D1319	27.0	C	-0.25	First reported 11.3
1634		-----		-----	
1706	in house	25.7		-1.23	
1710		-----		-----	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

normality	OK	
n	22	
outliers	0	
mean (n)	27.32	
st.dev. (n)	1.409	
R(calc.)	3.95	
R(D1319:10)	3.70	
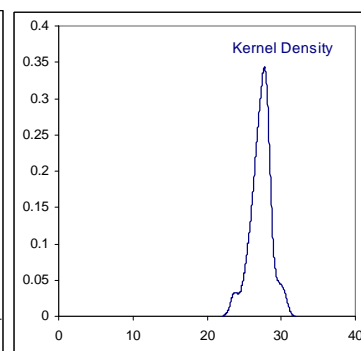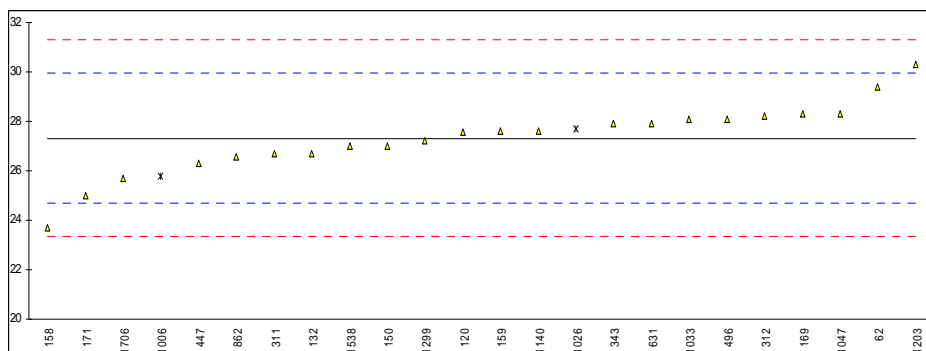
Determination of Aromatics by GC on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D5769	24.96		-1.57	
132	D5769	25.84		0.33	
150	D5769	25.3		-0.84	
158		-----		-----	
159	D5769	26.55		1.87	
169		-----		-----	
171	D5769	24.73		-2.07	
193		-----		-----	
311	EN14517	25.8		0.25	
312	ISO22854	26.1		0.89	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343		-----		-----	
447		-----		-----	
463		-----		-----	
494	EN22854	25.53		-0.34	
495	ISO22854	25.79		0.22	
496	EN22854	25.59		-0.21	
631		-----		-----	
862	EN14517	25.65		-0.08	
1006		-----		-----	
1026	D6729	27.7	G(0.01)	4.36	
1033		-----		-----	
1047		-----		-----	
1131	ISO22854	25.91		0.48	
1134	EN22854	26.15		1.00	
1140	IP566	25.96		0.59	
1203	EN14517	25.82		0.29	
1299	ISO22854	25.8		0.25	
1346	ISO22854	25.20		-1.05	
1459		-----		-----	
1538	ISO22854	25.74		0.12	
1634		-----		-----	
1706		-----		-----	
1710	EN14517	26.0		0.68	
1810	EN14517	25.46		-0.49	
1811	EN14517	25.92		0.51	
1951	EN14517	25.30		-0.84	
2146		-----		-----	

normality	OK
n	22
outliers	1
mean (n)	25.686
st.dev. (n)	0.4114
R(calc.)	1.152
R(EN14517:04)	1.294

Compare R(ISO22854:08) = 1.294
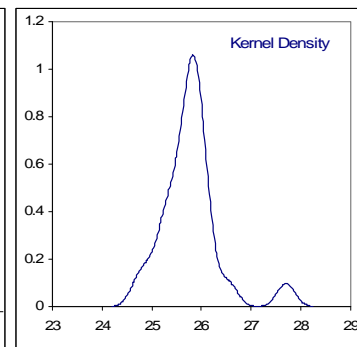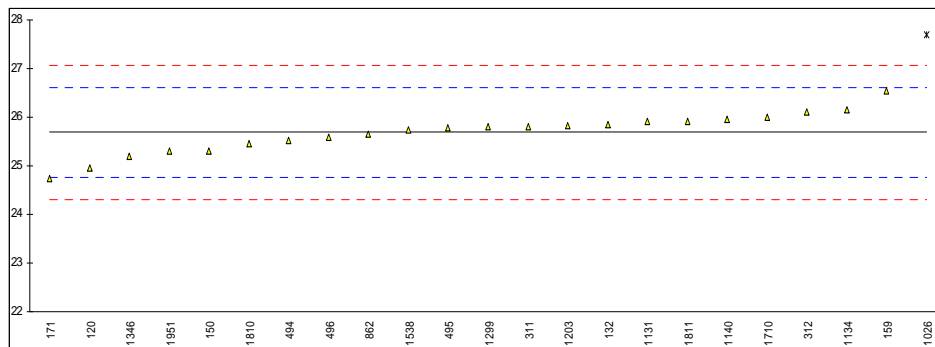
Determination of API gravity on sample #12070;

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D4052	61.30		0.31	
132	D4052	61.32		0.50	
150	D4052	61.3		0.31	
158	D4052	61.33		0.59	
159	D4052	61.28		0.13	
169	D4052	61.4		1.25	
171	D1298	61.1		-1.55	
193		-----		-----	
311		-----		-----	
312	D4052	61.27		0.03	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343	D1298	61.09		-1.65	
447	D1250	61.29		0.22	
463	calc.	61.28		0.13	
494	D4052	61.27		0.03	
495	D1298	61.4		1.25	
496	D4052	61.26		-0.06	
631	D4052	61.25		-0.15	
862	D1298	61.18		-0.81	
1006		-----		-----	
1026		-----		-----	
1033		-----		-----	
1047		-----		-----	
1131	ISO12185	61.20		-0.62	
1134	calc.	61.29		0.22	
1140		-----		-----	
1203		-----		-----	
1299		-----		-----	
1346		-----		-----	
1459		-----		-----	
1538		-----		-----	
1634	D1298	61.2		-0.62	
1706		-----		-----	
1710		-----		-----	
1810		-----		-----	
1811		-----		-----	
1951	D1298	61.32		0.50	
2146		-----		-----	

normality	OK
n	20
outliers	0
mean (n)	61.267
st.dev. (n)	0.0810
R(calc.)	0.227
R(D1298:05)	0.300
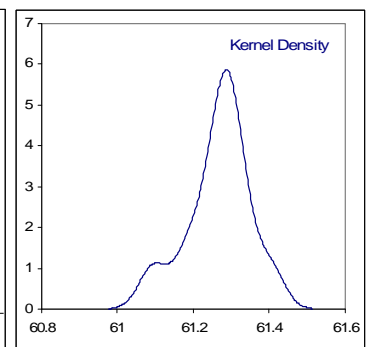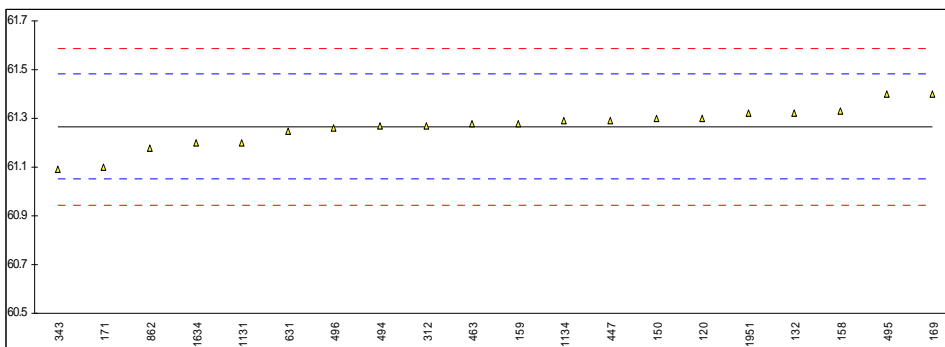
Determination of Benzene on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D5580	0.679		1.04	
120	D3606	0.664		-0.01	
132	D3606	0.687		1.60	
150	D3606	0.65		-0.99	
158	D3606	0.82	DG(0.01)	10.91	
159	D3606	0.58	G(0.05)	-5.89	
169		-----		-----	
171	D5769	0.63		-2.39	
193		-----		-----	
311	EN14517	0.65		-0.99	
312	ISO22854	0.66		-0.29	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340	EN238	0.65		-0.99	
343	EN238	0.54	G(0.01)	-8.69	
447	IP429	0.82	DG(0.01)	10.91	
463	EN238	0.705		2.86	
494	EN22854	0.65		-0.99	
495	ISO22854	0.67		0.41	
496	EN22854	0.670		0.41	
631		-----		-----	
862	EN14517	0.66		-0.29	
1006	D5580	0.67		0.41	
1026	EN12177	0.74	G(0.05)	5.31	
1033		-----		-----	
1047	EN238	0.65		-0.99	
1131	ISO22854	0.66		-0.29	
1134	EN22854	0.67		0.41	
1140	IP566	0.66		-0.29	
1203	EN14517	0.64		-1.69	
1299	ISO22854	0.68		1.11	
1346	ISO22854	0.66		-0.29	
1459	EN238	0.72		3.91	
1538	EN238	0.65		-0.99	
1634		-----		-----	
1706	in house	0.70		2.51	
1710	EN14517	0.67		0.41	
1810	EN14517	0.66		-0.29	
1811	EN14517	0.67		0.41	
1951	EN14517	0.66		-0.29	
2146	EN12177	0.617		-3.30	

normality	not OK	
n	29	
outliers	5	
mean (n)	0.664	
st.dev. (n)	0.0212	
R(calc.)	0.059	
R(EN14517:04)	0.040	Compare R(ISO22854:08) = 0.040
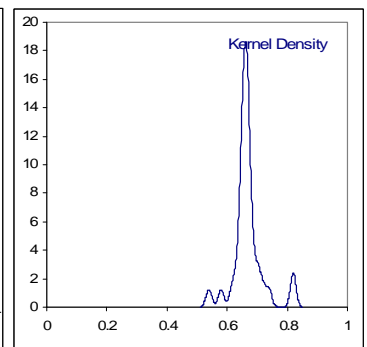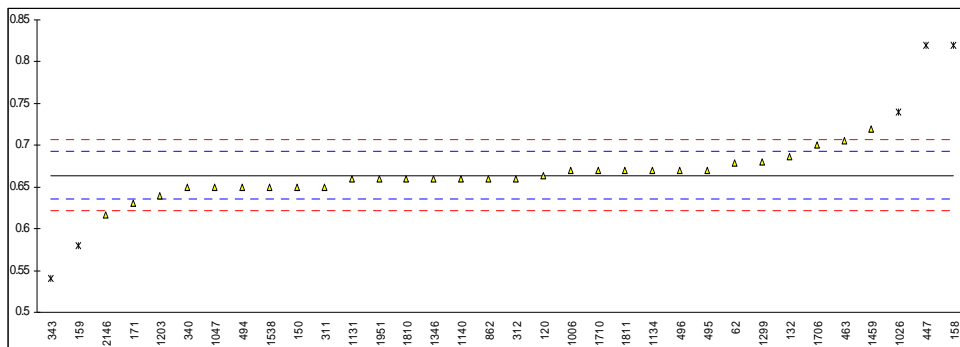
Determination of Copper strip 3hrs/50°C on sample #12070

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D130	1A		-----	
120	D130	1A		-----	
132	D130	1A		-----	
150	D130	1A		-----	
158	D130	1A		-----	
159	D130	1A		-----	
169	D130	1A		-----	
171	D130	1A		-----	
193		-----		-----	
311	D130	1A		-----	
312	D130	1A		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340	ISO2160	1		-----	
343	D130	1A		-----	
447	IP154	1A		-----	
463	ISO2160	1A		-----	
494	ISO2160	1		-----	
495		-----		-----	
496	D130	1A		-----	
631	D130	1A		-----	
862	D130	1A		-----	
1006	D130	1A		-----	
1026	ISO2160	1A		-----	
1033	IP154	1B		-----	
1047	ISO2160	1A		-----	
1131	ISO2160	1A		-----	
1134	ISO2160	1A		-----	
1140	D130	1B		-----	
1203	ISO2160	1		-----	
1299	ISO2160	1A		-----	
1346	ISO2160	1A		-----	
1459		-----		-----	
1538	ISO2160	1		-----	
1634	ISO2160	1A		-----	
1706		-----		-----	
1710	ISO2160	1A		-----	
1810		-----		-----	
1811	ISO2160	1		-----	
1951	ISO2160	1B		-----	
2146		-----		-----	

normality	n.a.	
n	33	
outliers	0	
mean (n)	1(1A)	
st.dev. (n)	n.a.	
R(calc.)	n.a.	
R(D130:10)	n.a.	

Determination of Density @ 15°C on sample #12070; results in kg/m^3

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D4052	734.09		1.51	
120	D4052	733.7		-0.67	
132	D4052	733.63		-1.06	
150	D4052	733.9		0.45	
158	D4052	733.7		-0.67	
159	D4052	733.8		-0.11	
169	D4052	733.4	DG(0.05)	-2.35	
171	ISO12185	734.14	C	1.79	First reported 0.73414
193		-----		-----	
311	ISO12185	733.8		-0.11	
312	D4052	733.8		-0.11	
334	ISO12185	733.7		-0.67	
335	ISO12185	733.4	C,DG(0.05)	-2.35	First reported 734.4
338	ISO12185	733.6		-1.23	
340	ISO12185	734.05		1.29	
343	ISO12185	734.07		1.40	
447	IP365	733.7		-0.67	
463	ISO12185	733.81		-0.06	
494	ISO12185	733.8		-0.11	
495	ISO12185	733.63		-1.06	
496	ISO12185	733.88		0.34	
631	D4052	733.9		0.45	
862	ISO12185	733.7		-0.67	
1006	D4052	734.4	G(0.05)	3.25	
1026	D4052	734.2		2.13	
1033	IP365	733.9		0.45	
1047	ISO12185	733.66		-0.90	
1131	ISO12185	733.6		-1.23	
1134	ISO12185	733.7	C	-0.67	First reported 0.7337
1140	D4052	733.7		-0.67	
1203	ISO12185	733.8		-0.11	
1299	D4052	734.1		1.57	
1346	ISO12185	733.80		-0.11	
1459	ISO3405	734.1	C	1.57	First reported 735.9
1538	ISO12185	733.9		0.45	
1634	ISO12185	733.9445		0.70	
1706	ISO12185	734.0		1.01	
1710	ISO12185	733.6		-1.23	
1810	ISO12185	733.7		-0.67	
1811	ISO12185	733.65		-0.95	
1951	IP365	733.56		-1.46	
2146	ISO12185	733.845		0.14	

normality	not OK	
n	38	
outliers	3	
mean (n)	733.82	
st.dev. (n)	0.175	
R(calc.)	0.49	
R(ISO12185:96)	0.50	
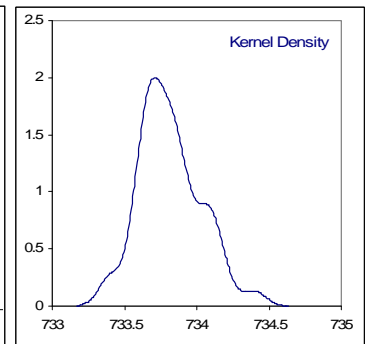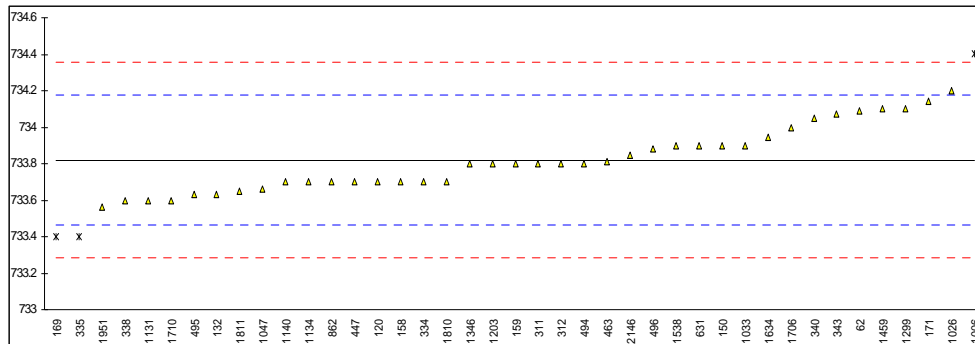
Determination of Distillation on sample #12070; results in °C

lab	method	IBP	mark	10%eva	mark	50%eva	mark	90%eva	mark	FBP	mark
52		-----		-----		-----		-----		-----	
62	D86-A	28.3		39.5		67.9		143.3		181.4	
120	D86-A	28.47		41.39		68.17		142.89		178.33	
132	D86-A	28.4		40.8		68.6		142.9		182.8	
150	D86-A	27.1		41.4		67.6		142.8		180.8	
158	D86-A	26.8		43.1		69.4		143.4		182.3	
159	D86-A	28.5		41.7		68.0		144.6		179.4	
169	D86-A	27.3		41.2		68.2		143.5		183.4	
171	ISO3405-A	29.3		42.0		67.5		143.3		178.3	
193		-----		-----		-----		-----		-----	
311	ISO3405-A	28.8		41.0		67.2		142.6		181.6	
312	D86-A	28.9		42.0		67.1		143.3		179.7	
334	D86-A	27.3		42.2		67.6		142.9		178.2	
335	D86-A	27.3		41.7		67.6		143.0		176.2	
338	ISO3405-A	29.1		39.9		67.0		143.5		176.2	
340	ISO3405-A	27.9		41.9		67.5		143.4		176.5	
343	ISO3405-A	30.1		44.8		70.1		148.7	G(0.01)	172.0	DG(0.05)
447	IP123-A	23.1	G(0.05)	41.5		67.9		143.1		177.3	
463	ISO3405-A	32.3		43.7	Fr 46.8	66.8	Fr 72.1	143.3	Fr 151.1	176.0	
494	ISO3405-A	27.5		41.3		67.7		143.0		175.7	
495	ISO3405-A	28.8		40.6		66.3		142.7		178.0	
496	ISO3405-A	26.8		41.8		67.7		142.1		170.8	DG(0.05)
631	D86-M	30.0		43.0		69.0		143.0		180.0	
862	ISO3405-A	28.3		42.1		68.0		143.4		179.1	
1006	D86-A	29.3		42.6		67.3		144.6		181.4	
1026		-----		-----		-----		-----		-----	
1033	IP123-A	33.0		43.0		69.4		143.8		178.8	
1047	ISO3405-A	31.2		42.2		68.1		143.4		179.6	
1131	D86-A	28.3		41.0		67.7		143.6		182.9	
1134	ISO3405-A	27.4		40.7		66.6		143.3		181.8	
1140	D86-M	25.7		41.6		67.7		142.3		177.7	
1203	ISO3405-A	30.9		43.0		69.6		145.0	DG(0.05)	179.4	
1299	D86-A	29.3		43.6		69.1		147.6	G(0.01)	179.5	
1346	ISO3405-A	30.2		42.8		68.8		144.0		178.9	
1459	ISO3405-A	25.7		41.3		67.6		142.9		177.1	
1538	ISO3405-A	29.9		43.9		69.3		144.7		182.1	
1634	ISO3405-A	25.7		41.1		69.0		142.5		178.1	
1706	ISO3405-A	26.0		44.1		71.3	G(0.05)	145.5	DG(0.05)	181.0	
1710	ISO3405-A	29.2		42.3		68.3		143.1		180.3	
1810	ISO3405-A	29.7		42.5		67.8		143.2		178.5	
1811	ISO3405-A	27.9		42.4		68.1		143.1		176.2	
1951	ISO3405-A	29.1		41.6		67.3		142.8		178.1	
2146	ISO3405-A	28.1		41.9		67.2		143.0		176.7	
	normality	OK		OK		OK		not OK		OK	
	n	39		40		39		36		38	
	outliers	1		0		1		4		2	
	mean (n)	28.56		42.00		67.99		143.23		179.19	
	st.dev. (n)	1.680		1.119		0.872		0.578		2.164	
	R(calc.)	4.70		3.13		2.44		1.62		6.06	
	R(ISO3405:11)	4.75		3.20		1.88		3.86		6.78	
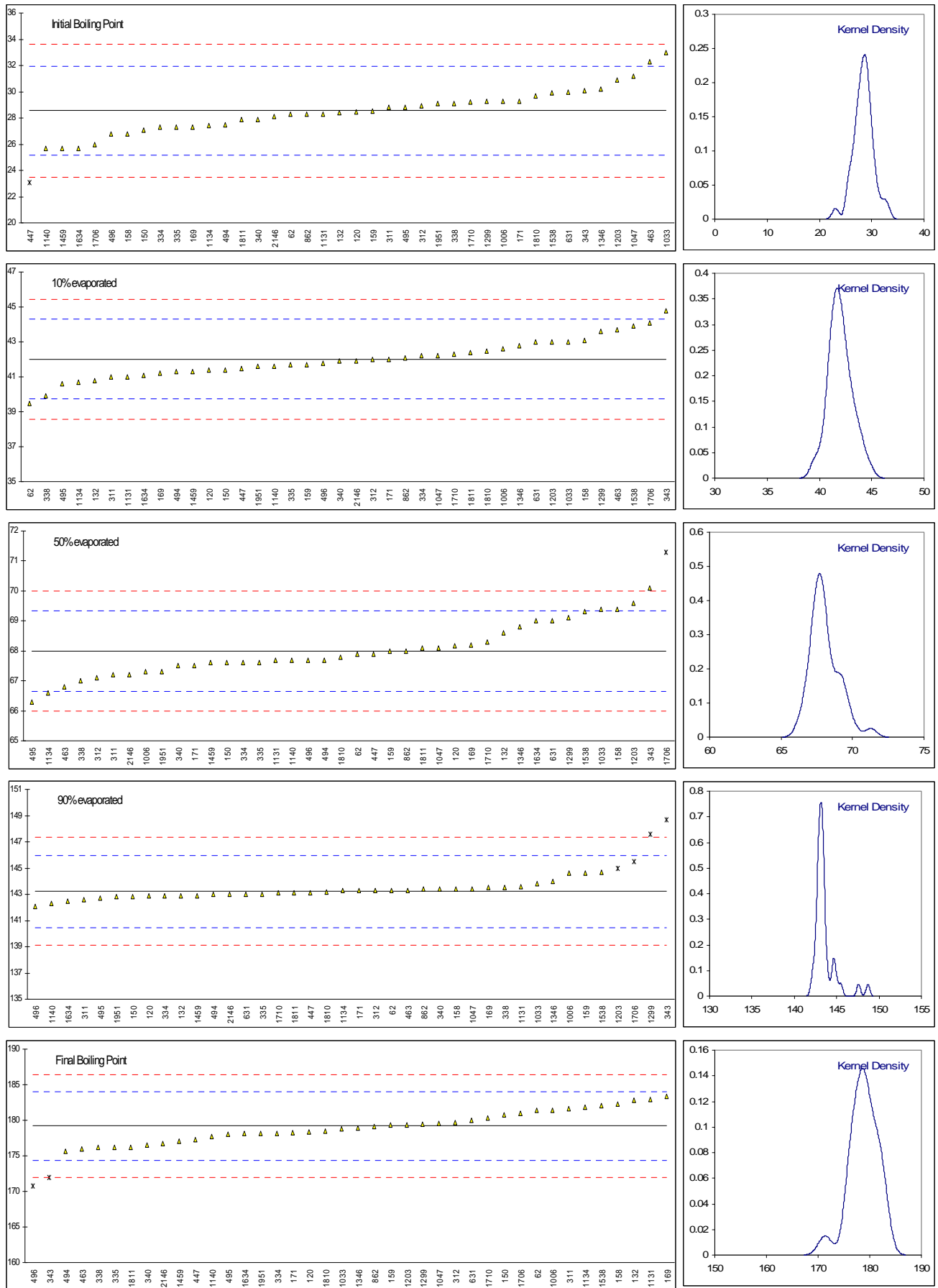
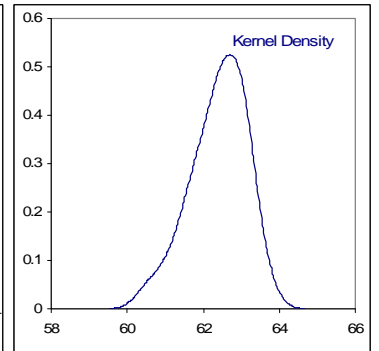Determination of Distillation on sample #12070; results in °C

lab	Method	%vol@70°C	mark	%vol@100°C	mark	%vol@150°C	mark	residue	mark
52		-----		-----		-----		-----	
62	D86-A	50.8		63.3		93.2		0.7	
120	D86-A	52.1		62.55		93.55		1.0	
132	D86-A	51.5		62.0		93.3		0.9	
150	D86-A	53.1		62.3		93.1		1.0	
158		-----		-----		-----		1.3	
159	D86-A	50.8		62.95		92.33		1.3	
169		-----		-----		-----		1.1	
171	ISO3405-A	52.3		62.3		93.1		1.1	
193		-----		-----		-----		-----	
311	ISO3405-A	53.0		62.9		93.5		0.9	
312	D86-A	52.8		61.9		93.2		1.0	
334	D86-A	52.0		61.7		93.3		1.0	
335	D86-A	52.9		61.8		93.3		0.9	
338	ISO3405-A	51.9	Fr 54.4	62.7		92.9		1.2	
340	ISO3405-A	52.0		62.0		93.0		1.2	
343	ISO3405-A	49.9		60.5		90.6	G(0.01)	1.2	
447	IP123-A	50.8		63.1		93.3		1.0	
463	ISO3405-A	52.3		63.7		92.9	Fr 79.7	1.2	
494	ISO3405-A	53.2		62.9		93.2		1.0	
495	ISO3405-A	53.4		63.2		93.2		1	
496	ISO3405-A	52.2		63.1		93.5		0.8	
631	D86-M	51.5		61.5		93.0		0.7	
862	ISO3405-A	52.1	Fr 50.5	61.2	Fr 59.6	92.9	Fr 91.3	1.1	
1006		-----		-----		-----		1.5	
1026		-----		-----		-----		-----	
1033	IP123-A	50.6		62.6		-----		1.4	
1047	ISO3405-A	52.0		62.4		93.0		1.2	
1131	D86-A	52.7		62.3		92.9		1.0	
1134	ISO3405-A	53.2		63.0		93.0		1.0	
1140	D86-M	52.2		62.9		93.5		1.0	
1203	ISO3405-A	50.2		61.4		92.3		1.0	
1299	D86-A	52.7		62.4		93.0		1.0	
1346	ISO3405-A	51.1		61.7		92.7		1.0	
1459		-----		-----		-----		1.0	
1538	ISO3405-A	50.9		62.6		92.9		0.5	
1634	ISO3405-A	50.4		63.4		92.7		1.0	
1706	ISO3405-A	48.9	G(0.05)	60.9		92.1		1.0	
1710	ISO3405-A	51.6		62.9		93.3		0.8	
1810	ISO3405-A	51.9		62.5		93.0		1	
1811	ISO3405-A	52.1		62.5		93.0		1	
1951	ISO3405-A	52.3		63.1		93.7		1.0	
2146	ISO3405-A	53.0		62.1		93.0		1.3	
	normality	OK		OK		not OK			
	n	35		36		34			
	outliers	1		0		1			
	mean (n)	51.93		62.40		93.06			
	st.dev. (n)	0.937		0.729		0.350			
	R(calc.)	2.62		2.04		0.98			
	R(ISO3405:11)	2.70		2.20		1.30			
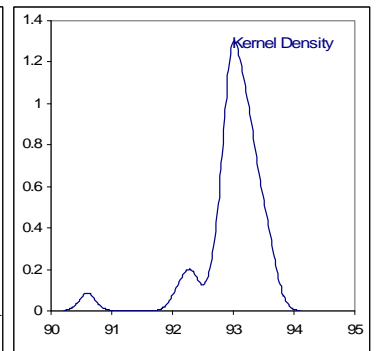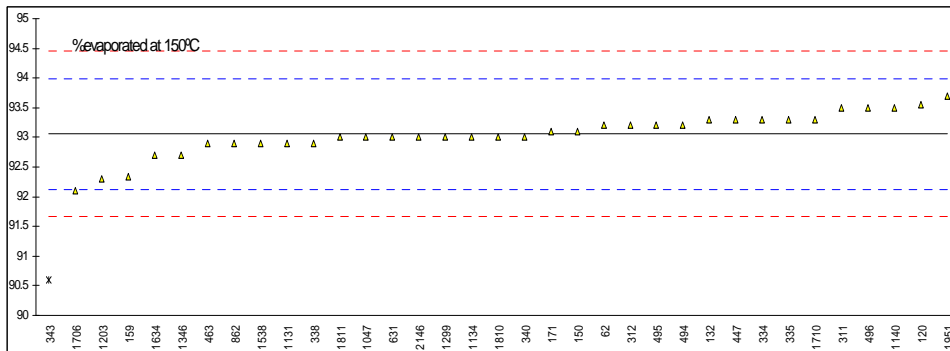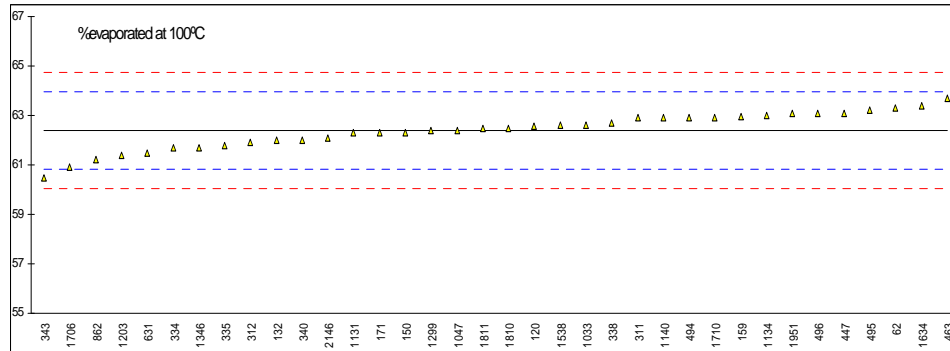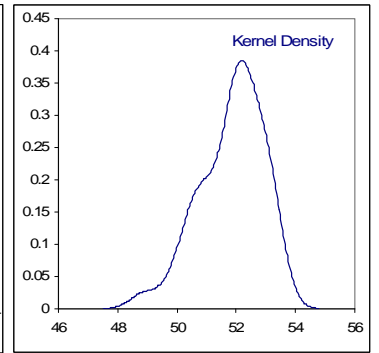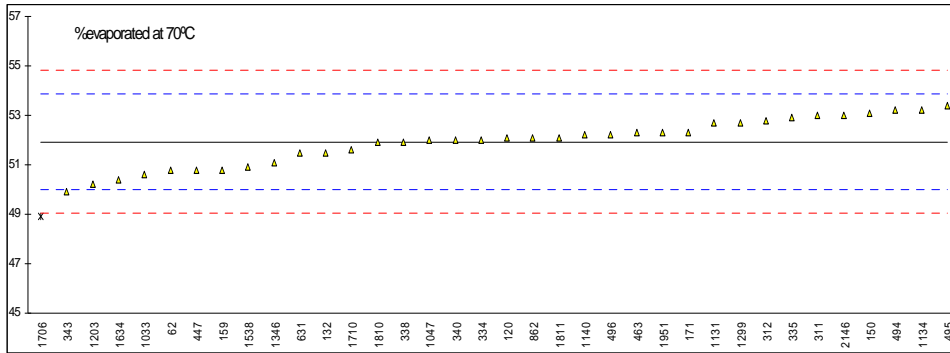
Determination of Doctor test on sample #12070

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D4925	NEG		-----	
132	D4925	NEG		-----	
150	D4925	NEG		-----	
158	D4925	NEG		-----	
159	D4925	NEG		-----	
169		-----		-----	
171	D4925	NEG		-----	
193		-----		-----	
311	D4925	NEG		-----	
312	IP30	NEG		-----	
334	D4925	NEG		-----	
335		-----		-----	
338		-----		-----	
340	D4925	NEG		-----	
343		-----		-----	
447	D4925	NEG		-----	
463	IP30	NEG		-----	
494	D4925	NEG		-----	
495		-----		-----	
496		-----		-----	
631		-----		-----	
862	D4925	NEG		-----	
1006		-----		-----	
1026	D4925	NEG		-----	
1033		-----		-----	
1047	IP30	NEG		-----	
1131		-----		-----	
1134	IP30	NEG		-----	
1140	IP30	NEG		-----	
1203	D4925	NEG		-----	
1299	IP30	NEG		-----	
1346		-----		-----	
1459		-----		-----	
1538		-----		-----	
1634		-----		-----	
1706		-----		-----	
1710	D4925	NEG		-----	
1810		-----		-----	
1811	D4925	NEG		-----	
1951	IP30	NEG		-----	
2146		-----		-----	

normality	n.a.	
n	23	
outliers	0	
mean (n)	Negative	
st.dev. (n)	n.a.	
R(calc.)	n.a.	
R(D4952:09)	n.a.	

Determination of Ethanol on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D5599	9.27		0.20	
132	D5599	9.326		0.30	
150	D5599	9.08		-0.14	
158		-----		-----	
159	D5599	9.84		1.20	
169	D4815	8.86		-0.53	
171		-----		-----	
193		-----		-----	
311	EN14517	8.6		-0.98	
312	ISO22854	9.56		0.71	
334	D4815	9.49		0.58	
335	EN1601	8.74		-0.74	
338		-----		-----	
340		-----		-----	
343	EN13132	9.77		1.08	
447	D4815	9.47		0.55	
463	EN13132	9.07		-0.16	
494	EN22854	9.17		0.02	
495	ISO22854	9.25		0.16	
496	EN22854	9.305		0.26	
631	D5845	9.8		1.13	
862	EN14517	8.95		-0.37	
1006	D4815	8.54		-1.09	
1026	EN13132	9.1		-0.10	
1033		-----		-----	
1047	EN1601	8.7		-0.81	
1131	ISO22854	9.59		0.76	
1134	ISO22854	8.42		-1.30	
1140	IP566	8.91		-0.44	
1203	EN14517	9.19		0.06	
1299	ISO22854	9.62		0.81	
1346	ISO22854	9.13		-0.05	
1459	EN14517	9.5		0.60	
1538	ISO22854	8.72		-0.77	
1634		-----		-----	
1706	EN13132	9.2		0.07	
1710	EN14517	9.00		-0.28	
1810	EN14517	9.36		0.35	
1811	EN14517	8.87		-0.51	
1951	EN14517	9.40		0.43	
2146	EN13132	8.590		-1.00	

normality	OK		
n	34		
outliers	0		
mean (n)	9.159		
st.dev. (n)	0.3801		
R(calc.)	1.064		
R(EN14517:04)	1.589	Compare R(EN13132:00) = 0.800	
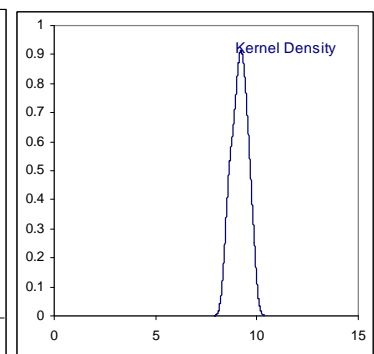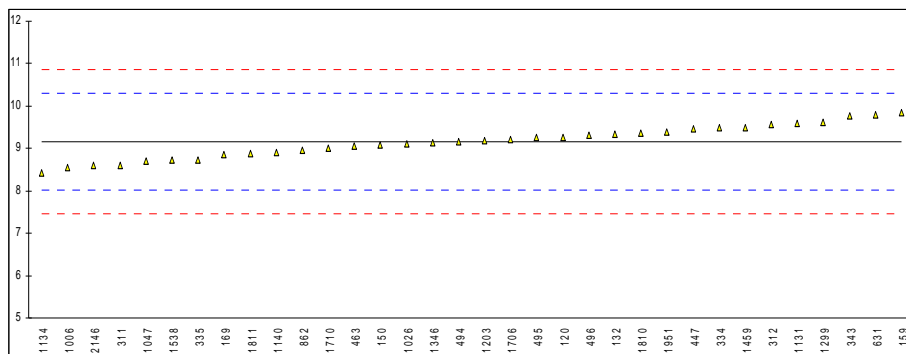
Determination of Existent Gum (washed) on sample #12070; results in mg/100mL

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	ISO6246	<0.5		-----	
120	D381	0.50		-0.24	
132	D381	0.2		-1.70	
150	D381	<0.5		-----	
158	D381	<0.5		-----	
159		-----		-----	
169		-----		-----	
171	ISO6246	0.1		-2.19	
193		-----		-----	
311	ISO6246	<1		-----	
312	D381	<0.5		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340	ISO6246	0.2		-1.70	
343	ISO6246	<1		-----	
447	IP131	0.4		-0.73	
463	ISO6246	<0.5		-----	
494	ISO6246	0.4		-0.73	
495		-----		-----	
496	ISO6246	1.7	G(0.05)	5.59	
631	D381	0.3		-1.21	
862	ISO6246	0.2		-1.70	
1006	D381	0.4		-0.73	
1026	IP540	<0.5		-----	
1033	IP131	0.0	ex	-2.67	Result excluded, zero is not a real result
1047	ISO6246	<1.0		-----	
1131	ISO6246	0.4		-0.73	
1134	ISO6246	<1		-----	
1140		-----		-----	
1203	ISO6246	1.3		3.64	
1299	D381	1.0		2.19	
1346	ISO6246	1.2		3.16	
1459		-----		-----	
1538	ISO6246	1		2.19	
1634		-----		-----	
1706		-----		-----	
1710	ISO6246	0.7		0.73	
1810	ISO6246	0.3		-1.21	
1811	ISO6246	0.3		-1.21	
1951	ISO6246	1.0		2.19	
2146		-----		-----	

normality	not OK
n	18
outliers	1
mean (n)	0.55
st.dev. (n)	0.381
R(calc.)	1.07
R(ISO6246:97)	0.58
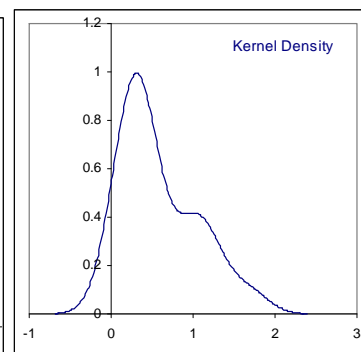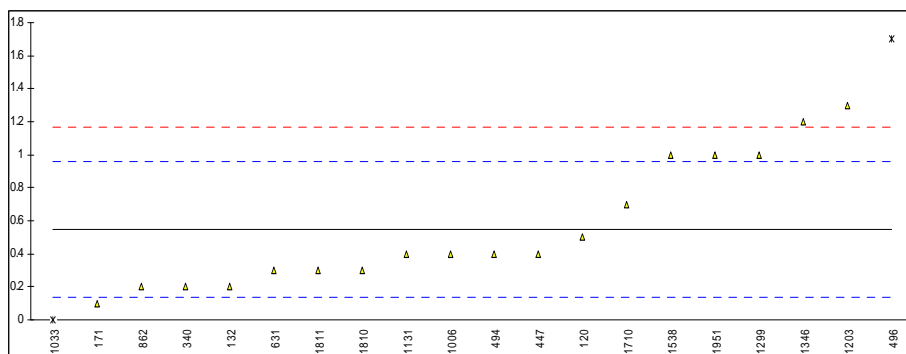
Determination of Lead as Pb on sample #12070; results in mg/L

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120		-----		-----	
132	D3237	<2.5		-----	
150	D3237	<2.6		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	INH-014	<0.01		-----	
193		-----		-----	
311		-----		-----	
312	EN237	<2.5		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343	EN237	<2.5		-----	
447	IP428	<2.5		-----	
463		-----		-----	
494		-----		-----	
495		-----		-----	
496	EN237	<2.5		-----	
631	EN237	<2.5		-----	
862	D3237	0.1		-----	
1006	D3237	<0.0025	U	-----	Possibly unit error?
1026		-----		-----	
1033		-----		-----	
1047	EN237	<1.0		-----	
1131	EN237	<2.5		-----	
1134		-----		-----	
1140		-----		-----	
1203	EN237	<1		-----	
1299	EN237	<2.5		-----	
1346		-----		-----	
1459	in house	<5		-----	
1538	EN237	<2.5		-----	
1634		-----		-----	
1706		-----		-----	
1710	EN237	<2.5		-----	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

	normality	n.a.	
	n	14	
	outliers	0	
	mean (n)	<2.5	
	st.dev. (n)	n.a.	
	R(calc.)	n.a.	
	R(EN237:96)	n.a.	Application range: 2.5 – 25 mg/L

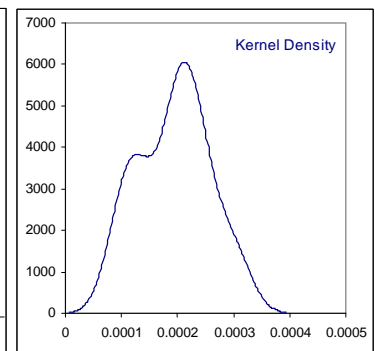Determination of Manganese as Mn on sample #12070; results in mg/L

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120		-----		-----	
132		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	INH-014	0.016		-----	
193		-----		-----	
311		-----		-----	
312	D3831	<0.25		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343		-----		-----	
447		-----		-----	
463		-----		-----	
494	EN16136	2.18	ex	-----	False positive result?
495		-----		-----	
496	EN16135	<2		-----	
631	D3831	<0.25		-----	
862	D3831	0.1		-----	
1006		-----		-----	
1026		-----		-----	
1033		-----		-----	
1047	EN16135	<1.0		-----	
1131	D3831	<0.25		-----	
1134		-----		-----	
1140		-----		-----	
1203	in house	<1		-----	
1299	D3831	<0.5		-----	
1346		-----		-----	
1459	in house	<5		-----	
1538		-----		-----	
1634		-----		-----	
1706		-----		-----	
1710		-----		-----	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

normality	not OK	
n	8	
outliers	0	
mean (n)	<1	
st.dev. (n)	n.a.	
R(calc.)	n.a.	
R(D3831:06)	n.a.	

Determination of Mercaptans as S on sample #12070; results in %M/M

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D3227	0.0002		0.05	
132	D3227	0.0001		-0.83	
150	D3227	0.0002		0.05	
158		-----		-----	
159	D3227	0.00013		-0.56	
169	D3227	0.0003		0.93	
171	D3227	0.00013		-0.56	
193		-----		-----	
311	D3227	<0.0003		-----	
312	UOP163	<0.0002		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340	D3227	0.0001		-0.83	
343		-----		-----	
447	D3227	<0.0003		-----	
463		-----		-----	
494	D3227	0.00021		0.14	
495		-----		-----	
496	D3227	0.00024		0.40	
631	D3227	0.0002		0.05	
862	D3227	0.00025		0.49	
1006		-----		-----	
1026	D3227	0.0002	C	0.05	Reported 2 (probably an unit error?)
1033		-----		-----	
1047	D3227	0.00023		0.32	
1131	D3227	0.00024		0.40	
1134	IP342	0.000114		-0.71	
1140	D3227	<0.0003	C	-----	Reported <3 (probably an unit error?)
1203	UOP163	0.00015		-0.39	
1299	D3227	0.0002		0.05	
1346		-----		-----	
1459		-----		-----	
1538		-----		-----	
1634		-----		-----	
1706		-----		-----	
1710	D3227	0.0003		0.93	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

normality	not OK	
n	18	
outliers	0	
mean (n)	0.00019	
st.dev. (n)	0.000062	
R(calc.)	0.00017	
R(D3227:10)	0.00032	Application range: 0.0003 – 0.01 %M/M
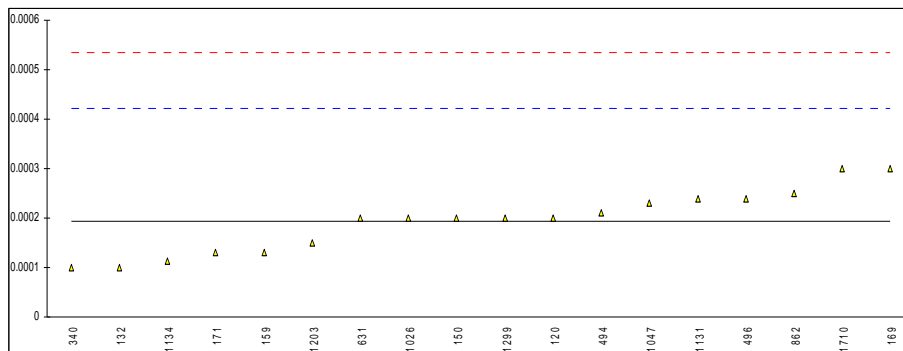
Determination of Olefins by FIA on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D1319	12.6		0.67	
120	D1319	11.95		0.16	
132	D1319	12.31		0.44	
150	D1319	11.7		-0.03	
158	D1319	14.0		1.76	
159	D1319	11.9		0.12	
169	D1319	11.7		-0.03	
171	D1319	10.6		-0.89	
193		-----		-----	
311	D1319	11.9		0.12	
312	D1319	11.8		0.05	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343	D1319	11.5		-0.19	
447	D1319	10.7		-0.81	
463		-----		-----	
494		-----		-----	
495		-----		-----	
496	D1319	9.9		-1.43	
631	D1319	11.89		0.12	
862	D1319	11.36		-0.30	
1006		-----		-----	
1026	D6729	12.0		0.20	
1033	IP156	18.7	C,G(0.01)	5.42	First reported 55.3
1047	D1319	11.7		-0.03	
1131		-----		-----	
1134		-----		-----	
1140	D1319	11.7		-0.03	
1203	D1319	11.5		-0.19	
1299	D1319	12.1		0.28	
1346		-----		-----	
1459		-----		-----	
1538	D1319	11.3	C	-0.34	First reported 27.0
1634		-----		-----	
1706	in house	12.2		0.36	
1710		-----		-----	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

normality	OK
n	22
outliers	1
mean (n)	11.74
st.dev. (n)	0.785
R(calc.)	2.20
R(D1319:10)	3.59
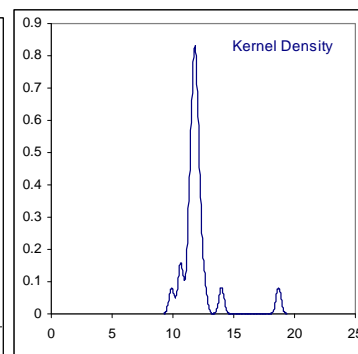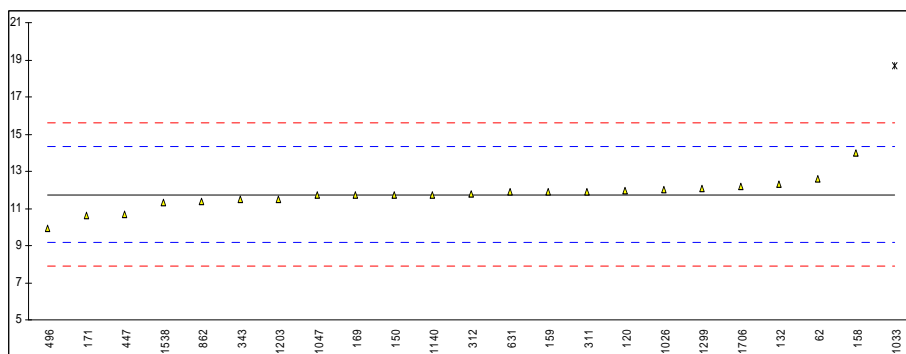
Determination of Olefins by GC on sample #12070; results in %V/V

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120		-----		-----	
132		-----		-----	
150		-----		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171		-----		-----	
193		-----		-----	
311	EN14517	12.0		-0.15	
312	ISO22854	11.8		-0.44	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340		-----		-----	
343		-----		-----	
447		-----		-----	
463		-----		-----	
494	EN22854	12.25		0.21	
495	ISO22854	12.33		0.33	
496	EN22854	12.20		0.14	
631		-----		-----	
862	EN14517	12.59		0.70	
1006	D6293	13.5	G(0.05)	2.02	
1026	D6729	12.0		-0.15	
1033		-----		-----	
1047		-----		-----	
1131	ISO22854	12.82		1.04	
1134		-----		-----	
1140	IP566	12.28		0.26	
1203	EN14517	11.81		-0.42	
1299	ISO22854	11.7		-0.58	
1346	ISO22854	11.70		-0.58	
1459		-----		-----	
1538	ISO22854	12.38		0.40	
1634		-----		-----	
1706		-----		-----	
1710	EN14517	12.3		0.28	
1810	EN14517	11.99		-0.16	
1811	EN14517	11.55		-0.80	
1951	EN14517	12.06		-0.06	
2146		-----		-----	

|		
normality	OK	
n	17	
outliers	1	
mean (n)	12.10	
st.dev. (n)	0.338	
R(calc.)	0.95	
R(EN14517:04)	1.94	
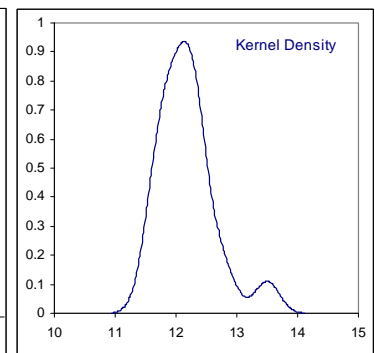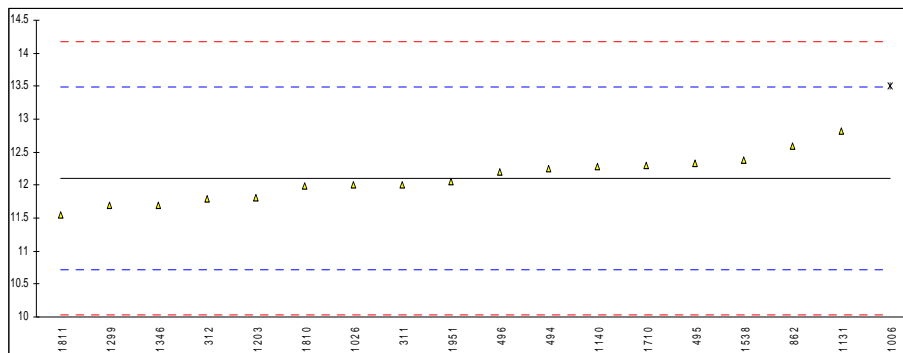
Determination of Oxidation Stability on sample #12070; results in minutes

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120		-----		-----	
132	D525	>2491		-----	
150	D525	>900		-----	
158		-----		-----	
159		-----		-----	
169		-----		-----	
171	D525	>900		-----	
193		-----		-----	
311	D525	>1500		-----	
312	D525	>900		-----	
334		-----		-----	
335		-----		-----	
338		-----		-----	
340	D525	>960		-----	
343	D525	386		-----	
447	IP40	>900		-----	
463		-----		-----	
494	ISO7536	>900		-----	
495		-----		-----	
496	ISO7536	>900		-----	
631	D525	685		-----	
862	D525	>900		-----	
1006	D525	915		-----	
1026		-----		-----	
1033	IP40	>960		-----	
1047	ISO7536	>900		-----	
1131		-----		-----	
1134		-----		-----	
1140	D525	>1440		-----	
1203	D525	525		-----	
1299	D525	>900		-----	
1346		-----		-----	
1459		-----		-----	
1538	ISO7536	>480		-----	
1634		-----		-----	
1706		-----		-----	
1710		-----		-----	
1810		-----		-----	
1811		-----		-----	
1951	IP40	>900		-----	
2146		-----		-----	

	normality	OK
	n	15
	outliers	0
	mean (n)	>900
	st.dev. (n)	n.a.
	R(calc.)	n.a.
	R(ISO7536:96)	n.a.

Determination of Oxygen content on sample #12070; results in %M/M

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D5599	3.74		0.26	
132	D5599	3.76		0.39	
150	D5599	3.42		-1.75	
158		-----		-----	
159	D5599	3.94		1.52	
169	D4815	3.33		-2.32	
171		-----		-----	
193		-----		-----	
311	EN14517	3.5		-1.25	
312	ISO22854	3.88		1.15	
334	D4815	3.92		1.40	
335	EN1601	3.47		-1.44	
338		-----		-----	
340		-----		-----	
343	EN13132	3.91		1.34	
447	D4815	3.80		0.64	
463	EN13132	3.65		-0.30	
494	EN22854	3.73		0.20	
495	ISO22854	3.76		0.39	
496	EN22854	3.755		0.36	
631		-----		-----	
862	EN14517	3.65		-0.30	
1006	D4815	3.82		0.77	
1026	EN13132	3.73		0.20	
1033		-----		-----	
1047	EN1601	3.45		-1.56	
1131	ISO22854	3.87		1.08	
1134		-----		-----	
1140	IP566	3.62		-0.49	
1203	EN14517	3.73		0.20	
1299	ISO22854	3.90		1.27	
1346	ISO22854	3.71		0.07	
1459		-----		-----	
1538	ISO22854	3.56		-0.87	
1634		-----		-----	
1706		-----		-----	
1710	EN14517	3.65		-0.30	
1810	EN14517	3.8		0.64	
1811	EN14517	3.60		-0.62	
1951	EN14517	3.79		0.58	
2146	EN13132	3.498		-1.26	

normality	OK
n	30
outliers	0
mean (n)	3.698
st.dev. (n)	0.1622
R(calc.)	0.454
R(EN14517:05)	0.444

Compare R(ISO22854) = 0.444
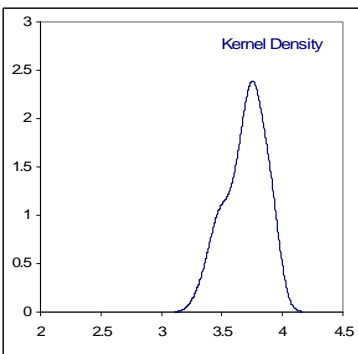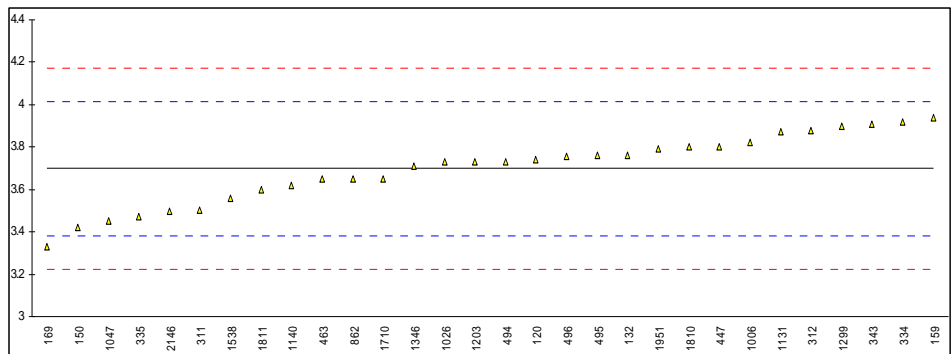
Determination of Sulphur on sample #12070; results in mg/kg

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D5453	6.3		0.71	
120	D2622	8.35	G(0.05)	3.94	
132	D2622	6.55		1.10	
150	D2622	7.6		2.76	
158	D5453	4.5		-2.13	
159	D5453	6.53		1.07	
169	D5453	6.1		0.39	
171	ISO20846	6.54		1.09	
193		-----		-----	
311	ISO20846	6.0		0.23	
312	D5453	5.5		-0.55	
334	ISO20846	6.4		0.87	
335	ISO20846	4.36		-2.35	
338	ISO20846	4.7		-1.82	
340	ISO20846	5.22		-1.00	
343	ISO20846	4.42		-2.26	
447	D5453	4.0		-2.92	
463		-----		-----	
494	ISO20846	6.8		1.50	
495	ISO20846	6.50		1.02	
496	ISO20846	5.72		-0.21	
631		-----		-----	
862	ISO20846	5.4		-0.71	
1006	D5453	5.7		-0.24	
1026	ISO20846	6.4		0.87	
1033		-----		-----	
1047	ISO20846	6.1		0.39	
1131	ISO20846	6.2		0.55	
1134		-----		-----	
1140	D5453	3.85		-3.16	
1203	ISO20846	6.4		0.87	
1299	ISO20846	5.6		-0.40	
1346		-----		-----	
1459	in house	6.0		0.23	
1538	ISO20846	5.7		-0.24	
1634		-----		-----	
1706	ISO20844	6.4		0.87	
1710	ISO20846	6.5		1.02	
1810	ISO20846	5.6		-0.40	
1811	ISO20846	5.7		-0.24	
1951	ISO20846	7.8		3.07	
2146	ISO20846	5.846		-0.01	

Only ISO20846 data:

normality	OK		OK
n	34		23
outliers	1		0
mean (n)	5.851		5.926
st.dev. (n)	0.9130		0.7887
R(calc.)	2.556		2.208
R(ISO20846:04)	1.775		1.784
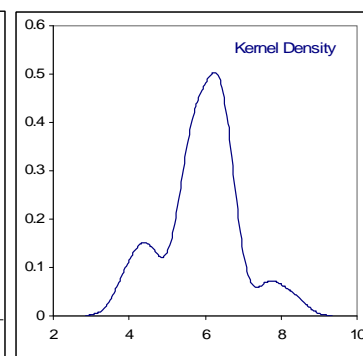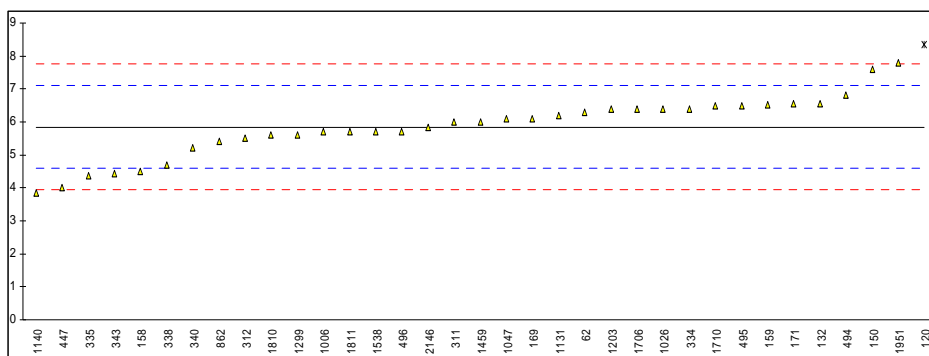
Determination of RON on sample #12070

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D2699	97.0		-1.38	
120	D2699	97.8		1.82	
132	D2699	97.0		-1.38	
150	D2699	97.4		0.22	
158		-----		-----	
159		-----		-----	
169	D2699	97.2		-0.58	
171	D2699	97.6		1.02	
193		-----		-----	
311		-----		-----	
312	D2699	97.4		0.22	
334	D2699	97.3		-0.18	
335		-----		-----	
338		-----		-----	
340	D2699	97.5		0.62	
343		-----		-----	
447	IP237	97.4		0.22	
463	D2699	97.21		-0.54	
494	D2699	97.37		0.10	
495	D2699	97.1		-0.98	
496	D2699	97.23		-0.46	
631	D2699	97.66		1.26	
862	D2699	97.28		-0.26	
1006	D2699	97.4		0.22	
1026	ISO5164	97.2		-0.58	
1033		-----		-----	
1047		-----		-----	
1131	ISO5164	97.3		-0.18	
1134		-----		-----	
1140		-----		-----	
1203	D2699	97.3		-0.18	
1299	D2699	97.6		1.02	
1346	ISO5164	97.3		-0.18	
1459		-----		-----	
1538	ISO5164	97.3		-0.18	
1634		-----		-----	
1706	in house	96.2	G(0.01)	-4.58	
1710	ISO5164	97.4		0.22	
1810		-----		-----	
1811		-----		-----	
1951	D2699	96.7	G(0.05)	-2.58	
2146		-----		-----	

normality	OK
n	24
outliers	2
mean (n)	97.344
st.dev. (n)	0.1936
R(calc.)	0.542
R(ISO5164:02)	0.700
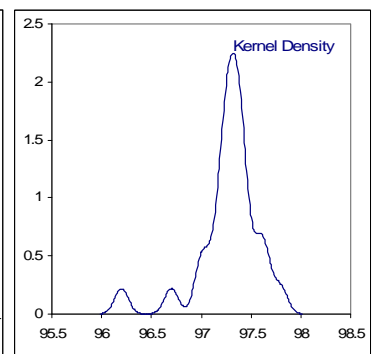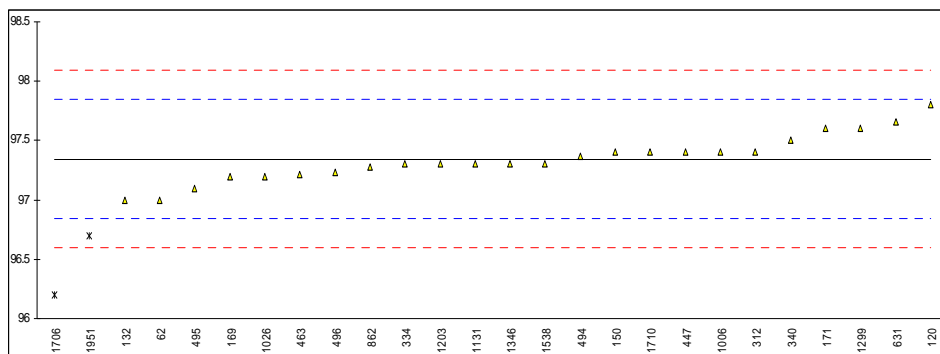
Determination of MON on sample #12070

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D2700	85.5	C	-0.62	First reported 84.7
120	D2700	85.6		-0.31	
132	D2700	85.3		-1.25	
150	D2700	86.3		1.87	
158		-----		-----	
159		-----		-----	
169	D2700	86.1		1.24	
171	D2700	85.4		-0.93	
193		-----		-----	
311		-----		-----	
312	D2700	85.8		0.31	
334	D2700	86.0		0.93	
335		-----		-----	
338		-----		-----	
340	D2700	86.2		1.55	
343		-----		-----	
447	IP236	87.0	G(0.05)	4.04	
463	D2700	86.19		1.52	
494	D2700	85.60		-0.31	
495	D2700	85.3		-1.25	
496	D2700	85.34		-1.12	
631		-----		-----	
862	D2700	85.38		-1.00	
1006		-----		-----	
1026	ISO5163	85.3		-1.25	
1033		-----		-----	
1047		-----		-----	
1131	ISO5163	86.0		0.93	
1134		-----		-----	
1140	D2700	85.1		-1.87	
1203	D2700	85.7		0.00	
1299	D2700	86.5		2.49	
1346	ISO5163	85.7		0.00	
1459		-----		-----	
1538	ISO5163	86.0		0.93	
1634		-----		-----	
1706	in house	85.3		-1.25	
1710	ISO5163	85.5		-0.62	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146		-----		-----	

normality	OK
n	23
outliers	1
mean (n)	85.700
st.dev. (n)	0.3903
R(calc.)	1.093
R(ISO5163:02)	0.900
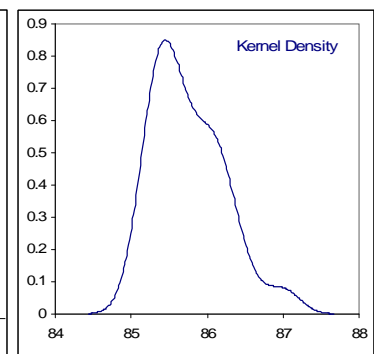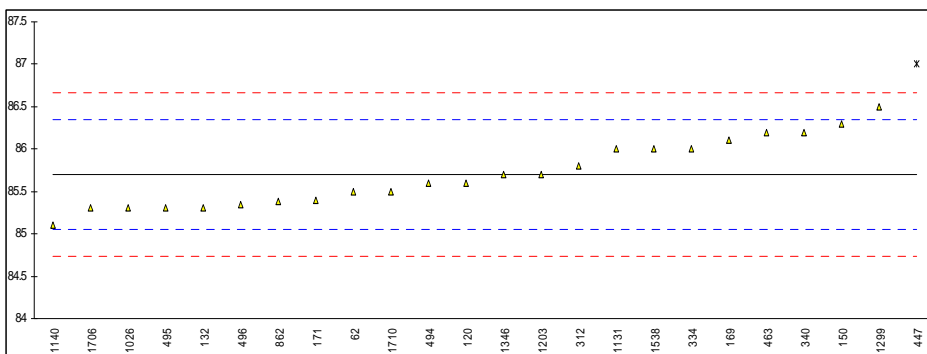
Determination of Total Vapour Pressure on sample #12071; results in psi

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D5191	14.52		0.74	
120	D5191	14.48		0.44	
132	D5191	14.47		0.37	
150	D5191	14.31		-0.81	
158	D5191	14.21		-1.54	
159	D5191	14.49		0.52	
169	D5191	14.45		0.22	
171	D5191	14.495		0.55	
193		-----		-----	
311	D5191	14.68		1.91	
312	D5191	14.49		0.52	
334	D5191	14.36		-0.44	
335		-----		-----	
338	D5191	14.425		0.04	
340		-----		-----	
447	D5191	14.30		-0.88	
494	D5191	14.45		0.22	
495	D5191	14.42		0.00	
496	D5191	14.32		-0.73	
631	D5191	14.61		1.40	
862	D5191	14.26		-1.17	
1006		-----		-----	
1026		-----		-----	
1033	IP394	14.4747		0.40	
1047		-----		-----	
1134	D5191	13.94	E,G(0.05)	-3.52	Reported 96.1 kPa
1203	EN13016	14.210		-1.54	
1299	D5191	14.74		2.35	
1346	D6378	14.27		-1.10	
1459	D5191	13.6	G(0.01)	-6.02	
1538	EN13016	14.45975		0.29	
1634	EN13016	14.531		0.82	
1710	D5191	14.4		-0.14	
1810	D5191	14.17		-1.83	
1811	D5191	14.24		-1.32	
1951		-----		-----	
2146	EN13016	14.516		0.71	

normality	OK
n	28
outliers	2
mean (n)	14.420
st.dev. (n)	0.1411
R(calc.)	0.395
R(D5191:10b)	0.381
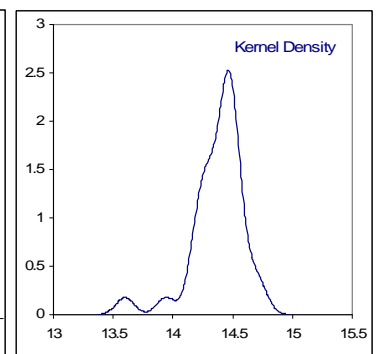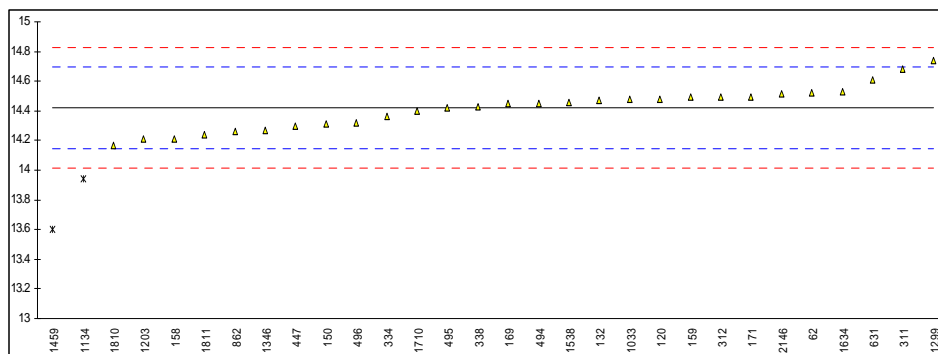
Determination of DVPE (ASTM D5191 calculation) on sample #12071; results in psi

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62	D5191	13.46		0.76	
120	D5191	13.42		0.46	
132	D5191	13.42		0.46	
150	D5191	13.26		-0.75	
158	D5191	13.16		-1.51	
159	D5191	13.44		0.61	
169	D5191	13.396		0.28	
171	D5191	13.440		0.61	
193		-----		-----	
311	D5191	13.59		1.74	
312	D5191	13.43		0.53	
334	D5191	13.31		-0.37	
335	D5191	13.37	C	0.08	First reported as TVP
338	D5191	13.372		0.09	
340	D5191	13.28		-0.60	
447	D5191	13.26		-0.75	
494	D5191	13.40		0.31	
495	D5191	13.36		0.00	
496	D5191	13.26		-0.75	
631	D5191	13.55		1.44	
862	D5191	13.21		-1.13	
1006	D5191	13.28		-0.60	
1026	D5191	13.4		0.31	
1033	IP394	13.4201		0.46	
1047	EN13016	13.26		-0.75	
1134	D5191	13.37	E	0.08	Reported 92.1885 kPa
1203	EN13016	13.164		-1.48	
1299	D5191	13.68		2.42	
1346	D6378	13.22		-1.05	
1459	D5191	12.6	G(0.01)	-5.74	
1538	EN13016	13.40566		0.35	
1634	EN13016	13.47442		0.87	
1710	D5191	13.35		-0.07	
1810	D5191	13.13		-1.73	
1811	D5191	13.22		-1.05	
1951		-----		-----	
2146	EN13016	13.460		0.76	

normality	OK	
n	34	
outliers	1	
mean (n)	13.359	
st.dev. (n)	0.1241	
R(calc.)	0.348	
R(D5191:10b)	0.371	
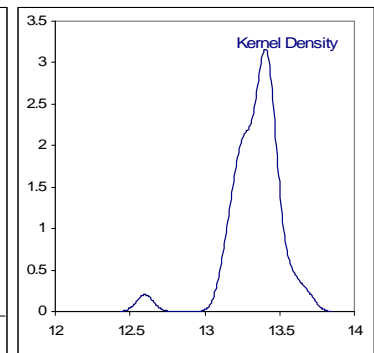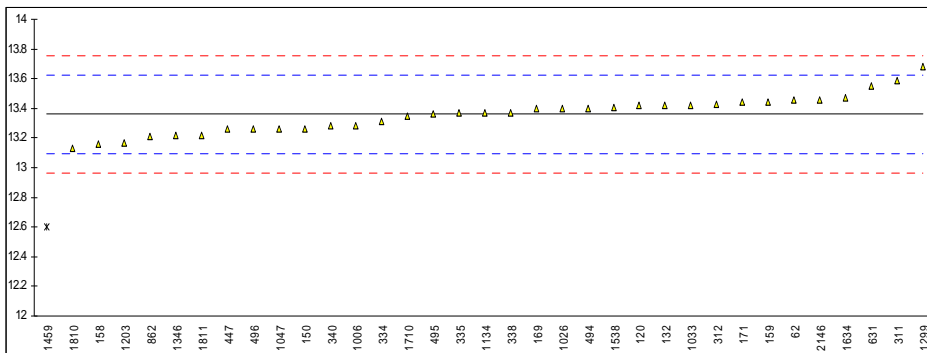
Determination of DVPE (EPA calculation) on sample #12071; results in psi

lab	method	value	mark	z(targ)	remarks
52		-----		-----	
62		-----		-----	
120	D5191	13.50		0.40	
132	D5191	13.49		0.32	
150	D5191	13.33		-0.88	
158	D5191	13.24		-1.56	
159	D5191	13.50		0.40	
169	D5191	13.467		0.15	
171	D5191	13.510		0.47	
193		-----		-----	
311	D5191	13.66		1.60	
312	D5191	13.51		0.47	
334	D5191	13.38		-0.51	
335		-----		-----	
338	D5191	13.443		-0.03	
340		-----		-----	
447	D5191	13.32		-0.96	
494	D5191	13.47		0.17	
495	D5191	13.41		-0.28	
496	D5191	13.34		-0.81	
631	D5191	13.62		1.30	
862	D5191	13.29		-1.19	
1006		-----		-----	
1026		-----		-----	
1033	IP394	13.4908		0.33	
1047		-----		-----	
1134	D5191	13.27	E	-1.34	Reported 91.5246 kPa
1203	EN13016	13.237		-1.58	
1299	D5191	13.75		2.28	
1346	D6378	13.30		-1.11	
1459	D5191	12.7	G(0.01)	-5.63	
1538	EN13016	13.47652		0.22	
1634	EN13016	13.54464		0.73	
1710	D5191	13.42		-0.21	
1810		-----		-----	
1811		-----		-----	
1951		-----		-----	
2146	EN13016	13.661		1.61	

normality	OK	
n	26	
outliers	1	
mean (n)	13.447	
st.dev. (n)	0.1348	
R(calc.)	0.377	
R(D5191:10b)	0.372	
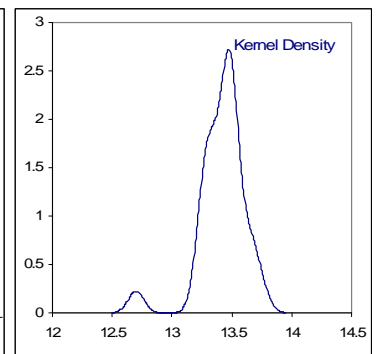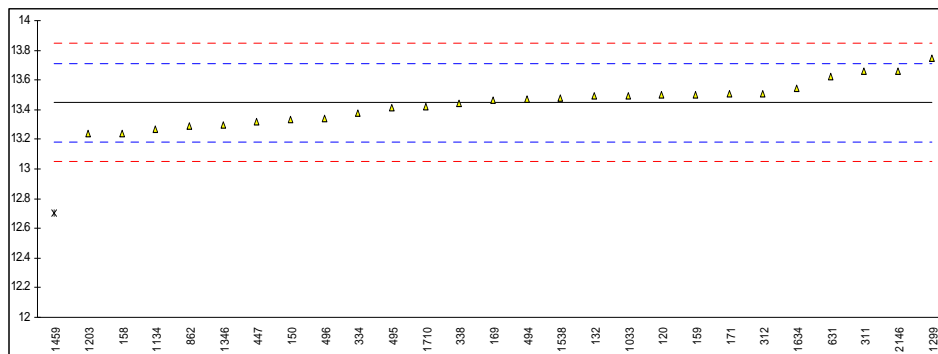
APPENDIX 2:

Z-scores of Distillation

lab	IBP	10%eva	50%eva	90%eva	FBP	%vol@70°C	%vol@100°C	%vol@150°C
52	-----	-----	-----	-----	-----	-----	-----	-----
62	-0.15	-2.19	-0.14	0.05	0.91	-1.17	1.15	0.31
120	-0.05	-0.54	0.26	-0.25	-0.36	0.18	0.19	1.07
132	-0.09	-1.05	0.90	-0.24	1.49	-0.44	-0.51	0.53
150	-0.86	-0.53	-0.59	-0.31	0.66	1.21	-0.12	0.10
158	-1.04	0.96	2.09	0.12	1.28	-----	-----	-----
159	-0.04	-0.27	0.01	0.99	0.09	-1.17	0.70	-1.56
169	-0.74	-0.70	0.31	0.20	1.74	-----	-----	-----
171	0.44	0.00	-0.74	0.05	-0.37	0.39	-0.12	0.10
193	-----	-----	-----	-----	-----	-----	-----	-----
311	0.14	-0.88	-1.18	-0.46	0.99	1.11	0.64	0.96
312	0.20	0.00	-1.33	0.05	0.21	0.90	-0.63	0.31
334	-0.74	0.17	-0.59	-0.24	-0.41	0.07	-0.89	0.53
335	-0.74	-0.27	-0.59	-0.17	-1.24	1.01	-0.76	0.53
338	0.32	-1.84	-1.48	0.20	-1.24	-0.03	0.39	-0.33
340	-0.39	-0.09	-0.74	0.12	-1.11	0.07	-0.51	-0.12
343	0.91	2.45	3.14	3.97	-2.97	-2.10	-2.41	-5.29
447	-3.22	-0.44	-0.14	-0.09	-0.78	-1.17	0.89	0.53
463	2.21	1.48	-1.78	0.05	-1.32	0.39	1.66	-0.33
494	-0.63	-0.62	-0.44	-0.17	-1.44	1.32	0.64	0.31
495	0.14	-1.23	-2.52	-0.38	-0.49	1.53	1.02	0.31
496	-1.04	-0.18	-0.44	-0.82	-3.47	0.28	0.89	0.96
631	0.85	0.87	1.50	-0.17	0.33	-0.44	-1.14	-0.12
862	-0.15	0.08	0.01	0.12	-0.04	0.18	-1.52	-0.33
1006	0.44	0.52	-1.03	0.99	0.91	-----	-----	-----
1026	-----	-----	-----	-----	-----	-----	-----	-----
1033	2.62	0.87	2.09	0.41	-0.16	-1.38	0.26	-----
1047	1.56	0.17	0.16	0.12	0.17	0.07	0.00	-0.12
1131	-0.15	-0.88	-0.44	0.27	1.53	0.80	-0.12	-0.33
1134	-0.68	-1.14	-2.08	0.05	1.08	1.32	0.77	-0.12
1140	-1.69	-0.35	-0.44	-0.68	-0.62	0.28	0.64	0.96
1203	1.38	0.87	2.39	1.28	0.09	-1.79	-1.27	-1.63
1299	0.44	1.40	1.65	3.17	0.13	0.80	0.00	-0.12
1346	0.97	0.70	1.20	0.56	-0.12	-0.86	-0.89	-0.77
1459	-1.69	-0.62	-0.59	-0.24	-0.86	-----	-----	-----
1538	0.79	1.66	1.94	1.07	1.20	-1.07	0.26	-0.33
1634	-1.69	-0.79	1.50	-0.53	-0.45	-1.59	1.28	-0.77
1706	-1.51	1.83	4.92	1.65	0.75	-3.14	-1.91	-2.06
1710	0.38	0.26	0.46	-0.09	0.46	-0.34	0.64	0.53
1810	0.67	0.43	-0.29	-0.02	-0.29	-0.03	0.13	-0.12
1811	-0.39	0.35	0.16	-0.09	-1.24	0.18	0.13	-0.12
1951	0.32	-0.35	-1.03	-0.31	-0.45	0.39	0.89	1.39
2146	-0.27	-0.09	-1.18	-0.17	-1.03	1.11	-0.38	-0.12

APPENDIX 3

Number of participants per country

1 lab in AUSTRIA

2 labs in CANADA

2 labs in CZECH REPUBLIC

1 lab in FINLAND

5 labs in FRANCE

3 labs in GERMANY

3 labs in HUNGARY

1 lab in LITHUANIA

1 lab in P.R. of CHINA

1 lab in PHILIPPINES

2 labs in POLAND

1 lab in PORTUGAL

2 labs in SPAIN

1 lab in SWEDEN

1 lab in TAIWAN R.O.C.

3 labs in THE NETHERLANDS

8 labs in U.S.A.

5 labs 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   = error in calculations
n.a.   = not applicable
n.e.   = not evaluated
W   = withdrawn
fr.   = first reported
U   = reported in different unit
SDS   = Safety Data Sheet

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
5   ISO 5725, parts 1-6, 1994
6   ISO13528-05
7   M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
8   W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
9   IP 367/84
10   DIN 38402 T41/42
11   P.L. Davies, 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/b205600n/)
15   H. Verplaetse and M. Lacourt, Accred Qual Assur (2006) 11:521-522