Results of Proficiency Test
Natural Gas Analysis
April 2019

Organized by: Institute for Interlaboratory Studies
Spijkenisse Netherlands

Author: ing. C.M. Nijssen-Wester
Correctors: ing. R.J. Starink & ing. G.A. Oosterlaken-Buijs

Report: iis19S01M

July 2019

CONTENTS

1 INTRODUCTION

Since 2009, the Institute for Interlaboratory Studies (iis) organizes a proficiency scheme for the analysis of Natural Gas every year. During the annual proficiency testing program 2018/2019, it was decided to continue the round robin for the analysis of Natural Gas. A co-operation with EffecTech (Uttoxeter, United Kingdom) was set up, because iis has limited gas-handling facilities in place to prepare gas samples. EffecTech is fully equipped and has experience in the preparation of synthetic Natural Gas samples for PT purposes.

In this interlaboratory study 64 laboratories from 33 different countries registered for participation. See appendix 2 for the number of participants per country. In this report, the results of the 2019 proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). To optimize the costs for the participating laboratories, it was decided to prepare one Natural Gas mixture. Samples were divided over a batch of 65 cylinders. The cylinder size is a cost-effective one-liter cylinder. Each cylinder was uniquely numbered. The limited cylinder size is chosen to optimize transport and handling costs.

Sample analyzes for fit-for-use and homogeneity testing were subcontracted to an ISO/IEC 17025 accredited laboratory. Participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 QUALITY SYSTEM

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, has implemented a quality system based on ISO/IEC17043:2010. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from participants on the reported data is encouraged and customer's satisfaction is measured on a regular basis by sending out questionnaires.

EffecTech is an accredited provider of proficiency testing schemes for the preparation of PT samples in homogeneous and stable batches under the requirements of ISO/IEC17043:2010 by UKAS (no. 4719). EffecTech maintains also an ISO/IEC17025 accreditation for the calibration and assignment of reference values for these samples.

2.2 PROTOCOL

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

2.3 CONFIDENTIALITY STATEMENT

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

2.4 SAMPLES

In this proficiency test one gas sample was used. The necessary one liter cylinders with artificial natural gas mixture were prepared and tested for homogeneity by EffecTech (Uttoxeter, United Kingdom) in conformance with ISO Guide 35: 2006 and ISO/IEC17043:2010.
One batch of 65 cylinders was prepared (job 19/0074) starting in January 2019. Each cylinder was uniquely numbered. Every cylinder in the batch was analyzed using replicate measurements. The within bottle and between bottle variations were then assessed in accordance with ISO Guide 35:2006 (Annex A.1). This evaluation showed that the between bottle variations were all small compared to the uncertainties on the reference values on each component. Hence, a single reference value could be safely assigned to the entire batch of samples.
The repeatability values (r) were calculated per component by multiplication of the respective standard deviation by 2.8. Subsequently, the calculated repeatabilities were compared with 0.3 times the reproducibility of the reference test method in agreement with the procedure of ISO 13528, Annex B2 in the next table.

Component	r (abs, observed) in %mol/mol	0.3 x R (abs, ISO6974-3:18) in %mol/mol
Methane	0.0040	0.0681
Ethane	0.0016	0.0285
Propane	0.0009	0.0192
iso-Butane	0.0005	0.0090
n-Butane	0.0006	0.0099
Carbon dioxide	0.0006	0.0065
Nitrogen	0.0012	0.0224

Table 1: evaluation of homogeneity test results against ISO6974-3 requirements of subsamples #19060

From the above table, it is clear that all observed repeatabilities are far less than 0.3 times the respective reproducibilities of the reference test method ISO6974-3:18.
Therefore, the homogeneity of the prepared batch was assumed.

To each of the participating laboratories one 1L gas cylinder, labelled #19060 was sent on April 3, 2019. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

EffecTech (Uttoxeter, United Kingdom) declares that the prepared gas cylinders have a shelf life of at least 6 months. This is sufficient for the proficiency testing purposes.

2.6 ANALYSES

The participants were requested to determine on sample #19060: Methane, Ethane, Propane, iso-Butane, n-Butane, Carbon dioxide, Nitrogen, Carbon content and for Real Gas conditions for two different combinations of combustion and metering temperature the following properties: Superior or Gross Caloric Value, Inferior or Net Caloric Value, Density, Relative Density and Wobbe Index.

It was explicitly requested to treat the sample as if it was a routine sample and to report the test results using the indicated units on the report form and not to round the test results, but report as much significant figures as possible. It was also requested not to report ‘less than’ test results, which are above the detection limit, because such test results cannot be used for meaningful statistical evaluations.

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

3 RESULTS

During five weeks after sample dispatch, the test results of the individual laboratories were gathered via the data entry portal www.kpmd.co.uk/sgs-iis/. The reported test results are tabulated per determination in appendix 1 of this report. The laboratories are presented by their code numbers.
Directly after the deadline, a reminder was sent to those laboratories that had not reported test results at that moment.

Shortly after the deadline, the available test results were screened for suspect data. A test result was called suspect in case the Huber Elimination Rule (a robust outlier test) found it to be an outlier. The laboratories that produced these suspect data were asked to check the reported test results (no reanalysis). Additional or corrected test results are used for data analysis and the original test results are placed under the test result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

The protocol followed in the organization of this proficiency test was the one as described for proficiency testing in the report 'iis Interlaboratory Studies: Protocol for the Organisation, Statistics and Evaluation' of June 2018 (iis-protocol, version 3.5).

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

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

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

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

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

3.2 GRAPHICS

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

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

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

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. ISO, EN or ASTM reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of variation in this interlaboratory study.

The target standard deviation was calculated from the target reproducibility by division with 2.8. In case no literature reproducibility was available, other target values were used. In some cases, a reproducibility based on former iis proficiency tests could be used.

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

The z-scores were calculated in accordance with:

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

The $z_{(target)}$ scores are listed in the test result tables of appendix 1.

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

	$\lvert z \rvert < 1$	good
$1 <$	$\lvert z \rvert < 2$	satisfactory
$2 <$	$\lvert z \rvert < 3$	questionable
$3 <$	$\lvert z \rvert$	unsatisfactory

4 EVALUATION

In this proficiency test several problems were encountered with the dispatch of the samples. Laboratories in Mexico, the People's Republic of China and the Russian Federation did receive the samples late due to several reasons.

Finally, five participants did not report any test results at all and not all laboratories were able to report all the analyses requested. In total 59 participants reported 698 numerical test results. Observed were 32 outlying test results, which is 4.6% of the numerical test results. In proficiency studies outlier percentages of 3% - 7.5% are quite normal.

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

4.1 EVALUATION PER COMPONENT AND PER PARAMETER

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

Three laboratories (92, 529 and 6234) reported deviating test results for many of the gas composition test results. At least three of the seven test results were statistical outliers. As the seven test results are not independent, it was decided not to use any of the reported results of these laboratories for the statistical evaluation, therefore, the other reported test results were excluded. Also, the reported test results for the parameters calculated from the measured Gas Composition were excluded for these three laboratories, when not marked as a statistical outlier.
Two laboratories (1081 and 1106) had a large deviation for the sum of the composition results (resp. a total of 100.4% and 99.3%). The calculated parameters based on these not normalized results were also excluded, when not marked as a statistical outlier.

Methane: The determination of this component was problematic depending on the test method used as reference test method. Six statistical outliers were observed. However, the calculated reproducibility after rejection of the statistical outliers is in agreement with the requirements of ISO6974-3:18, but not in agreement with the requirements of ASTM D1945:14.

Ethane: The determination of this component may be problematic for a number of participants. Four statistical outliers were observed and one other test result was excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with both the requirements of ISO6974-3:18 and ASTM D1945:14.

Propane: The determination of this component was not problematic. One statistical outlier was observed and two other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in agreement with both the requirements of ISO6974-3:18 and ASTM D1945:14.

iso-Butane: The determination of this component may be problematic depending on the test method used as reference test method. Two statistical outliers were observed and one other test result was excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ISO6974-3:18, but it is in agreement with the requirements of ASTM D1945:14.

n-Butane: The determination of this component may be problematic depending on the test method used as reference test method. One statistical outlier was observed and two other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ISO6974-3:18, but it is in agreement with the requirements of ASTM D1945:14.

Carbon dioxide: The determination of this component may be problematic depending on the test method used as reference test method. Two statistical outliers were observed and three other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of ISO6974-3:18, but it is in agreement with the requirements of ASTM D1945:14.

Nitrogen: The determination of this component was very problematic. Four statistical outliers were observed and two other test results were excluded. The calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of ISO6974-3:18, nor with the requirements of ASTM D1945:14.

Carbon content: The determination of this component was not problematic. No statistical outliers were observed. The calculated reproducibility is in good agreement with the requirements of EN15984:17.

Calculated parameters, general remark:

In this PT, the calculated parameters for Real Gas were reported for two combustion temperatures (15°C and 25°C). The number of participants with test results for 15°C and 25°C varied between 16 and 36.
In total twenty-five possible calculation errors were observed. Fourteen laboratories had one or two possible calculation errors (twenty in total) and laboratory 1106 had five, which may have been the reported test results for the values for Ideal Gas conditions at combustion temperature 25°C instead of the Real Gas conditions of combustion temperature 15°C.

Caloric Value (Superior or Gross): The calculation at combustion temperature 25°C/metering temperature 0°C may not be problematic. Two statistical outliers were observed and one other test result was excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.13 vs. 0.26).

The calculation at combustion temperature 15°C/metering temperature 15°C may not be problematic. One statistical outlier was observed and two other test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.14 vs. 0.19).

Caloric Value (Inferior or Net): The calculation at combustion temperature 25°C/metering temperature 0°C may not be problematic. One statistical outlier was

observed and three other test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (26 vs. 30).

The calculation at combustion temperature 15°C/metering temperature 15°C may not be problematic. One statistical outlier was observed and four other test results were excluded. The variation was very small com-pared to the observed variation in last year's PT: iis18S01M (20 vs. 59).

Density: The calculation at combustion temperature 25°C/metering temperature 0°C may not be problematic. One statistical outlier was observed and one other test results was excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.0030 vs. 0.0038).

The calculation at combustion temperature 15°C/metering temperature 15°C may not be problematic. One statistical outlier was observed and two other test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.0028 vs. 0.0033).

Relative Density: The calculation at combustion temperature 25°C/metering temperature 0°C may not be problematic. No statistical outliers were observed, but two test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.0024 vs. 0.0032).

The calculation at combustion temperature 15°C/metering temperature 15°C may not be problematic. One statistical outlier was observed and two other test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.0021 vs. 0.0026).

Wobbe Index: The calculation at combustion temperature 25°C/metering temperature 0°C may not be problematic. Two statistical outliers were observed and one other test result was excluded. The variation was very small compared to the observed variation in last year's PT: iis18S01M (0.112 vs. 0.293).

The calculation at combustion temperature 15°C/metering temperature 15°C may not be problematic. Two statistical outliers were observed and two other test results were excluded. The variation was small compared to the observed variation in last year's PT: iis18S01M (0.121 vs. 0.171).

4.2 PERFORMANCE EVALUATION FOR THE GROUP OF LABORATORIES

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

Component	unit	n	average	2.8 * sd	R(ISO6974-3)	R(D1945)
Methane	%mol/mol	53	90.048	0.202	0.227	0.15
Ethane	%mol/mol	54	3.508	0.081	0.095	0.10
Propane	%mol/mol	56	2.023	0.071	0.064	0.10
iso-Butane	%mol/mol	56	0.699	0.035	0.030	0.07
n-Butane	%mol/mol	56	0.800	0.046	0.033	0.07
Carbon dioxide	%mol/mol	54	0.446	0.034	0.022	0.07
Nitrogen	%mol/mol	53	2.486	0.147	0.074	0.10
Carbon content	g/100g	9	72.60	0.64	2.16	R(EN15984)

Table 2: reproducibilities of the composition of sample #19060

Without further statistical calculations it can be concluded that for several components there is not a good compliance of the group of participating laboratories with the relevant reference test method. The problematic components have been discussed in paragraph 4.1.

The average values for Real Gas and the corresponding calculated reproducibilities are summarized in tables 3 and 4.

Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C				
Parameter	unit	n	average	2.8 * sd
Caloric Value (Superior or Gross)	MJ/m^3	22	42.276	0.128
Caloric Value (Inferior or Net)	kJ/100g	12	4706.87	26.17
Density	kg/m^3	23	0.8124	0.0030
Relative Density		22	0.6283	0.0024
Wobbe Index	MJ/m^3	21	53.324	0.112

Table 3: performance of the group for combustion temperature of 25°C, Real Gas

Real gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C				
Parameter	unit	n	average	2.8 * sd
Caloric Value (Superior or Gross)	MJ/m^3	33	40.087	0.139
Caloric Value (Inferior or Net)	kJ/100g	17	4705.25	20.45
Density	kg/m^3	32	0.7695	0.0028
Relative Density		33	0.6280	0.0021
Wobbe Index	MJ/m^3	29	50.586	0.121

Table 4: performance of the group for combustion temperature of 15°C, Real Gas

4.3 COMPARISON OF THE PROFICIENCY TEST OF APRIL 2019 WITH PREVIOUS PTS

	April 2019	April 2018	April 2017	April 2016
Number of reporting labs	59	59	56	60
Number of test results	698	700	650	691
Number of statistical outliers	32	46	41	50
Percentage outliers	4.6%	6.6%	6.3%	7.2%

Table 5: comparison with previous proficiency tests

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

The performance of the determinations of the proficiency tests was compared against the requirements of the respective reference test methods. The conclusions are given the following tables.

Component	2019 ISO6974-3	2019 D1945	2018 ISO6974-3	2018 D1945	2017 ISO6974-3	2017 D1945	2016 ISO6974-3	2016 D1945
Methane	+	-	--	--	-	-	--	--
Ethane	+	+	+/-	-	+/-	+	+/-	-
Propane	+/-	+	-	+/-	-	++	-	++
iso-Butane	-	++	+	++	+/-	++	+/-	++
n-Butane	-	+	+	++	+/-	++	-	++
Carbon dioxide	-	+	--	+	-	++	--	+/-
Nitrogen	--	-	--	--	--	-	--	--

Table 6: comparison determinations of sample #19060 against test method ISO6974-3 / ASTM D1945

Component	2019	2018	2017	2016
Carbon content	++	++	++	++

Table 7: comparison determination of sample #19060 against EN15984

The performance of the determinations against the requirements of the respective reference test method is listed in the above tables. The following performance categories were used:

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

5 DISCUSSION

The observed reproducibilities for Methane, Ethane and Propane are in agreement with the reproducibility requirements of ISO6974-3 and therefore it can to be concluded that the group is improving for these components over the years. The group of laboratories still have problems with the determination of the other components.

The average values per component as determined in this PT are compared with the average values from the homogeneity testing by the supplier EffecTech in the following table.

Component	Average values by EffecTech in %mol/mol	Average values from participants results in %mol/mol	Absolute differences in %mol/mol
Methane	90.0373	90.0484	0.0111
Ethane	3.4990	3.5084	0.0094
Propane	2.0210	2.0233	0.0023
iso-Butane	0.6992	0.6993	0.0001
n-Butane	0.7995	0.7998	0.0003
Carbon dioxide	2.4976	0.4456	-0.0009
Nitrogen	0.4465	2.4859	-0.0117

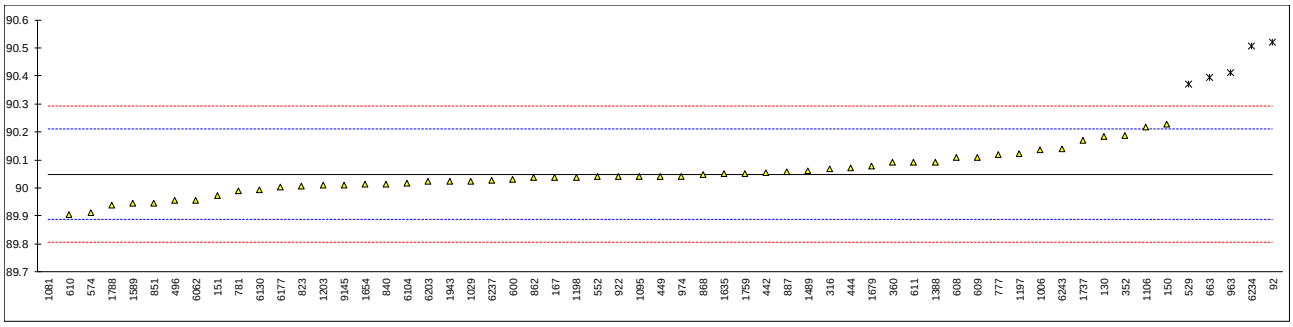
Table 8: comparison of average values of this PT with the values determined by the supplier EffecTech

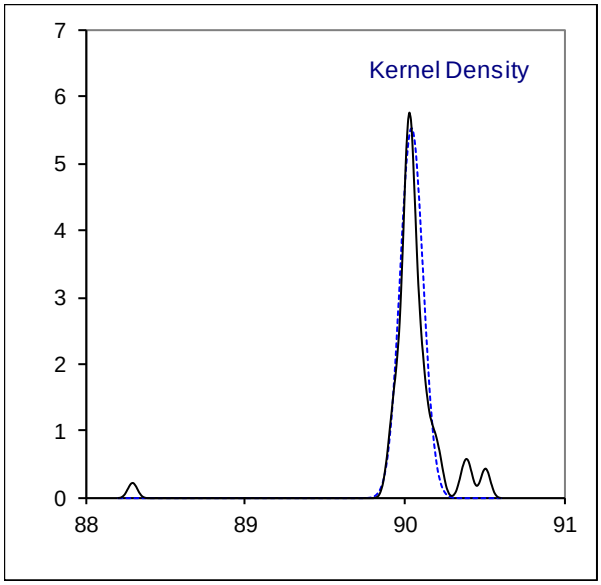
From the comparison in table 8 it is clear that the average values as determined in this PT are all very well in line with the values as determined during the preparation of the gas cylinders.

APPENDIX 1

Determination of Methane on sample #19060; results in %mol/mol

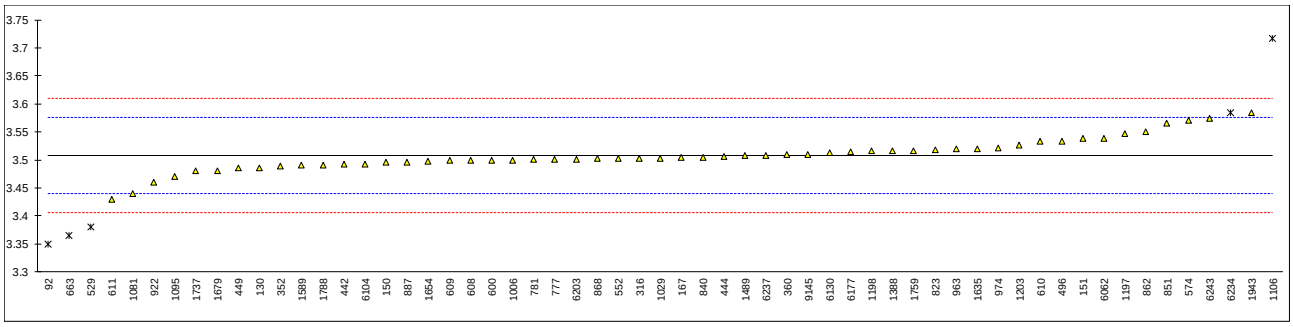
lab	Method	value	mark	z(targ)	remarks
92	D2286	90.52	R(0.01)	5.82	
130	ISO6974-3	90.183		1.66	
150	D1945	90.229		2.23	
151	GPA2261	89.97225		-0.94	
167	GPA2261	90.0379		-0.13	
225		-----		-----	
316	ISO6974-3	90.0675		0.24	
352	ISO6974-3	90.1883	C	1.73	first reported: 90.5799
360	ISO6974-3	90.09		0.51	
442	D1945	90.0550		0.08	
444	D1945	90.0698		0.26	
446		-----		-----	
449	ISO6974-3	90.0411		-0.09	
496	EN15984	89.956		-1.14	
525		-----		-----	
529	D1945	90.37	R(0.01)	3.97	
552	D1945	90.039		-0.12	
574	GPA2286	89.912		-1.68	
593		-----		-----	
600	GPA2261	90.03		-0.23	
608	GPA2261	90.11		0.76	
609	GPA2261	90.1101		0.76	
610	GPA2261	89.904		-1.78	
611	GPA2261	90.09		0.51	
663	D1945	90.395	C,R(0.01)	4.28	first reported: 90.425
777	ISO6974-6	90.12		0.88	
781	GOST31371.1	89.99		-0.72	
823	GPA2261	90.005		-0.54	
840	GPA2286	90.0130		-0.44	
851	GPA2261	89.947		-1.25	
862	GPA2261	90.037		-0.14	
868	GPA2261	90.047		-0.02	
887	D1945	90.059		0.13	
922	GPA2261	90.04		-0.10	
963	D1945	90.411	R(0.01)	4.47	
974	ISO6974-5	90.042		-0.08	
1006	D1945	90.137	C	1.09	first reported: 90.058
1029	D1945	90.025		-0.29	
1081	In house	88.296	R(0.01)	-21.62	
1095	EN15984	90.04		-0.10	
1106	GPA2286	90.218		2.09	
1197	D1945	90.122		0.91	
1198	D1945	90.038		-0.13	
1203		90.0085		-0.49	
1388	GPA2261	90.093		0.55	
1489	ISO6974-3	90.061		0.16	
1589	D1945	89.946		-1.26	
1635	D1945	90.050		0.02	
1654	D1945	90.012		-0.45	
1679	ISO6974-3	90.078		0.37	
1737	In house	90.17		1.50	
1759	ISO6974-5	90.051	C	0.03	first reported: 89.826
1788	D7833	89.9372		-1.37	
1943	ISO6974-3	90.0230		-0.31	
6062	ISO6974-3	89.956		-1.14	
6104	GPA2261	90.017		-0.39	
6105		-----		-----	
6130	GB/T13610	89.9944		-0.67	
6177	GPA2261	90.003		-0.56	
6203	ISO6975	90.022		-0.33	
6234	GPA2261	90.5049	C,R(0.01)	5.63	first reported: 88.6601
6237	ISO6974-3	90.028		-0.25	
6243	EN15984	90.14		1.13	
9145	GPA2261	90.01		-0.47	
	normality	OK			
	n	53			
	outliers	6			
	mean (n)	90.0484			
	st.dev. (n)	0.07224			
	R(calc.)	0.2023			
	st.dev.(ISO6974-3:18)	0.08104			compare R(D1945:14) = 0.15
	R(ISO6974-3:18)	0.2269			compare R(ISO6974-3:00) = 0.1801

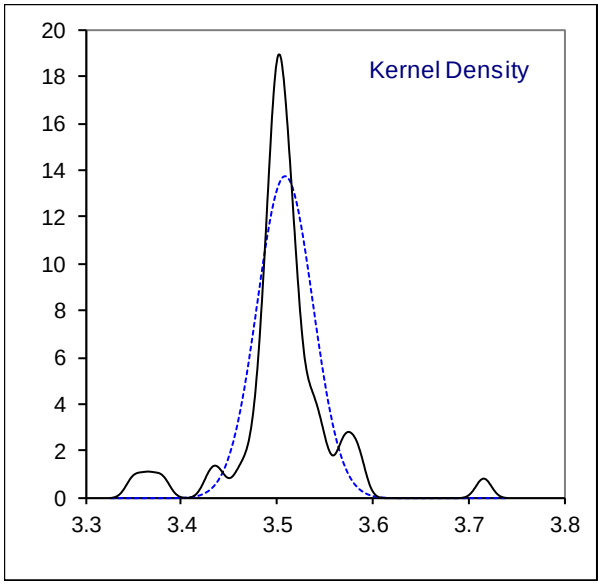

90.6
90.5
90.4
90.3
90.2
90.1
90
89.9
89.8
89.7
1081 610 574 1788 1589 851 496 6062 151 781 6130 6177 823 1203 9145 1654 840 6104 6203 1943 1029 6237 600 862 167 1198 552 922 1095 449 974 868 1635 1759 442 887 1489 316 444 1679 360 611 1388 608 609 777 1197 1006 6243 1737 130 352 1106 150 529 663 963 6234 92


Kernel Density
7
6
5
4
3
2
1
0
88
89
90
91

Determination of Ethane on sample #19060; results in %mol/mol

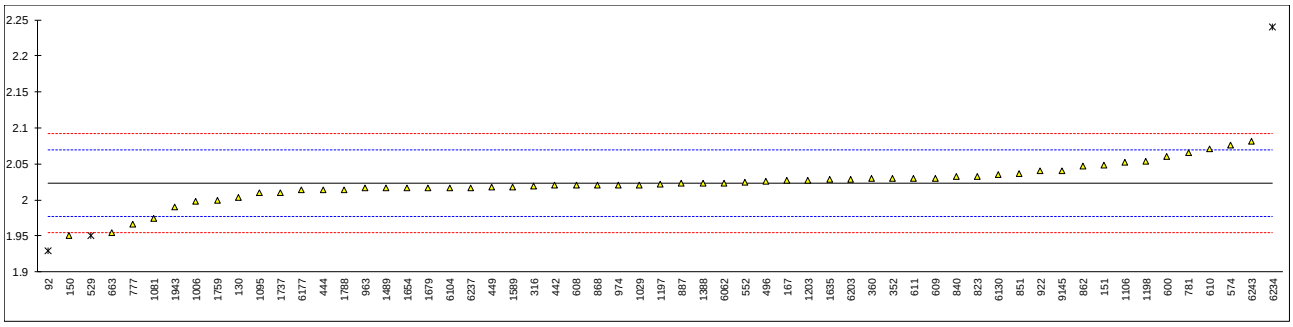
lab	method	value	mark	z(targ)	remarks
92	D2286	3.35	R(0.01)	-4.66	
130	ISO6974-3	3.486		-0.66	
150	D1945	3.495		-0.39	
151	GPA2261	3.53875		0.89	
167	GPA2261	3.5041		-0.13	
225		-----		-----	
316	ISO6974-3	3.5030		-0.16	
352	ISO6974-3	3.4898	C	-0.55	first reported: 3.4811
360	ISO6974-3	3.51		0.05	
442	D1945	3.4918		-0.49	
444	D1945	3.5056		-0.08	
446		-----		-----	
449	ISO6974-3	3.4854		-0.68	
496	EN15984	3.534		0.75	
525		-----		-----	
529	D1945	3.38	R(0.01)	-3.78	
552	D1945	3.502		-0.19	
574	GPA2286	3.571		1.84	
593		-----		-----	
600	GPA2261	3.50		-0.25	
608	GPA2261	3.50		-0.25	
609	GPA2261	3.4991		-0.27	
610	GPA2261	3.533		0.72	
611	GPA2261	3.43		-2.31	
663	D1945	3.365	C,R(0.01)	-4.22	first reported: 3.465
777	ISO6974-6	3.501		-0.22	
781	GOST31371.1	3.501		-0.22	
823	GPA2261	3.518		0.28	
840	GPA2286	3.5042		-0.12	
851	GPA2261	3.566		1.70	
862	GPA2261	3.550		1.23	
868	GPA2261	3.502		-0.19	
887	D1945	3.495		-0.39	
922	GPA2261	3.46		-1.42	
963	D1945	3.519		0.31	
974	ISO6974-5	3.521		0.37	
1006	D1945	3.500	C	-0.25	first reported: 3.496
1029	D1945	3.503		-0.16	
1081	In house	3.440		-2.01	
1095	EN15984	3.47		-1.13	
1106	GPA2286	3.716	R(0.01)	6.11	
1197	D1945	3.547		1.14	
1198	D1945	3.516		0.22	
1203		3.5260		0.52	
1388	GPA2261	3.516		0.22	
1489	ISO6974-3	3.508		-0.01	
1589	D1945	3.490		-0.54	
1635	D1945	3.519		0.31	
1654	D1945	3.498		-0.31	
1679	ISO6974-3	3.481		-0.81	
1737	In house	3.48		-0.84	
1759	ISO6974-5	3.517	C	0.25	first reported: 3.557
1788	D7833	3.4903		-0.53	
1943	ISO6974-3	3.5850		2.26	
6062	ISO6974-3	3.539		0.90	
6104	GPA2261	3.492		-0.48	
6105		-----		-----	
6130	GB/T13610	3.5121		0.11	
6177	GPA2261	3.515		0.19	
6203	ISO6975	3.501		-0.22	
6234	GPA2261	3.5846	ex,C	2.24	excluded, see paragraph 4.1, first reported: 5.3704
6237	ISO6974-3	3.508		-0.01	
6243	EN15984	3.574		1.93	
9145	GPA2261	3.51		0.05	
	normality	suspect			
	n	54			
	outliers	4 (+1ex)			
	mean (n)	3.5084			
	st.dev. (n)	0.02904			
	R(calc.)	0.0813			
	st.dev.(ISO6974-3:18)	0.03396			compare R(D1945:14) = 0.10
	R(ISO6974-3:18)	0.0951			compare R(ISO6974-3:00) = 0.1053

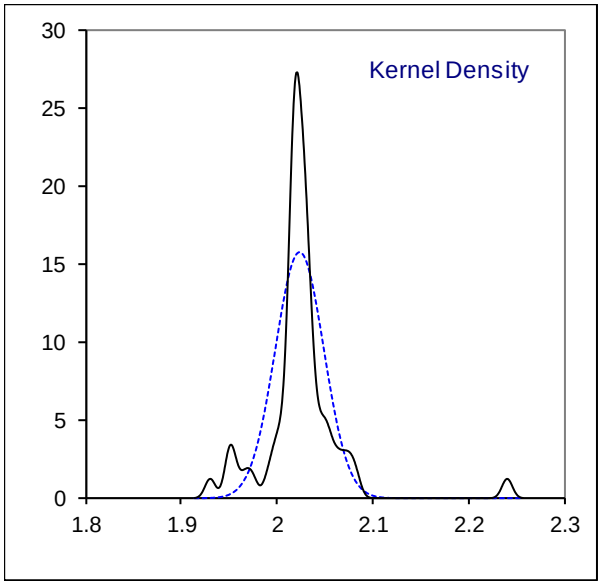

3.75
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
92 663 529 611 1081 922 1095 1737 1679 449 130 352 1589 1788 442 6104 150 887 1654 609 608 600 1006 781 777 6203 868 552 316 1029 167 840 444 1489 6237 360 9145 6130 6177 1198 1388 1759 823 963 1635 974 1203 610 496 151 6062 1197 862 851 574 6243 6234 1943 1106


Kernel Density
20
18
16
14
12
10
8
6
4
2
0
3.3
3.4
3.5
3.6
3.7
3.8

Determination of Propane on sample #19060; results in %mol/mol

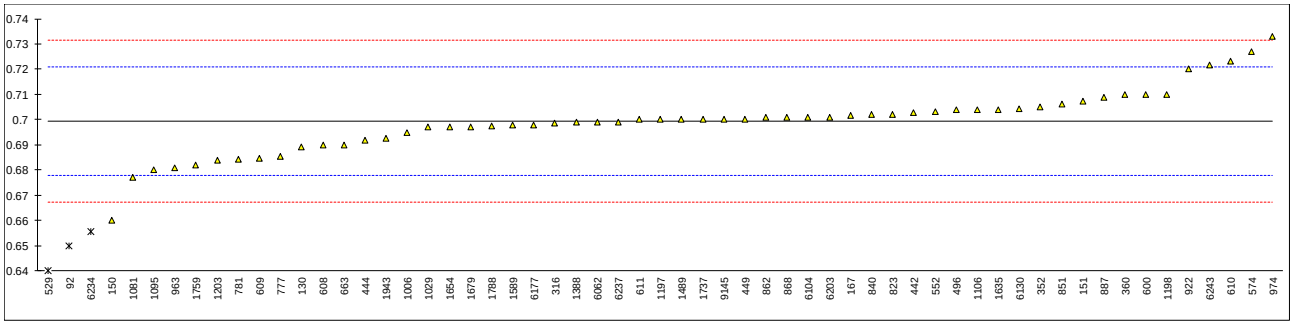
lab	method	value	mark	z(targ)	remarks
92	D2286	1.93	ex	-4.07	excluded, see paragraph 4.1
130	ISO6974-3	2.004		-0.84	
150	D1945	1.95	C	-3.20	first reported: 1.89
151	GPA2261	2.04775		1.07	
167	GPA2261	2.0270		0.16	
225		-----		-----	
316	ISO6974-3	2.0188		-0.20	
352	ISO6974-3	2.0300	C	0.29	first reported: 2.000
360	ISO6974-3	2.03		0.29	
442	D1945	2.0200		-0.14	
444	D1945	2.0145		-0.38	
446		-----		-----	
449	ISO6974-3	2.0179		-0.23	
496	EN15984	2.026		0.12	
525		-----		-----	
529	D1945	1.95	ex	-3.20	excluded, see paragraph 4.1
552	D1945	2.025		0.08	
574	GPA2286	2.076		2.30	
593		-----		-----	
600	GPA2261	2.06		1.60	
608	GPA2261	2.02		-0.14	
609	GPA2261	2.0303		0.31	
610	GPA2261	2.071		2.08	
611	GPA2261	2.03		0.29	
663	D1945	1.955	C	-2.98	first reported: 1.920
777	ISO6974-6	1.966		-2.50	
781	GOST31371.1	2.065		1.82	
823	GPA2261	2.033		0.42	
840	GPA2286	2.0320		0.38	
851	GPA2261	2.036		0.56	
862	GPA2261	2.047		1.04	
868	GPA2261	2.020		-0.14	
887	D1945	2.023		-0.01	
922	GPA2261	2.04		0.73	
963	D1945	2.016		-0.32	
974	ISO6974-5	2.021		-0.10	
1006	D1945	1.998	C	-1.10	first reported: 2.029
1029	D1945	2.021		-0.10	
1081	In house	1.974		-2.15	
1095	EN15984	2.01		-0.58	
1106	GPA2286	2.052		1.25	
1197	D1945	2.022		-0.06	
1198	D1945	2.054		1.34	
1203		2.0272		0.17	
1388	GPA2261	2.023		-0.01	
1489	ISO6974-3	2.017		-0.27	
1589	D1945	2.018		-0.23	
1635	D1945	2.029		0.25	
1654	D1945	2.017		-0.27	
1679	ISO6974-3	2.017		-0.27	
1737	In house	2.01		-0.58	
1759	ISO6974-5	2.000	C	-1.02	first reported: 2.096
1788	D7833	2.0146		-0.38	
1943	ISO6974-3	1.9906		-1.43	
6062	ISO6974-3	2.023		-0.01	
6104	GPA2261	2.017		-0.27	
6105		-----		-----	
6130	GB/T13610	2.0346		0.49	
6177	GPA2261	2.014		-0.40	
6203	ISO6975	2.029		0.25	
6234	GPA2261	2.2399	C,R(0.01)	9.46	first reported: 1.9474
6237	ISO6974-3	2.017		-0.27	
6243	EN15984	2.082		2.56	
9145	GPA2261	2.04		0.73	
	normality	suspect			
	n	56			
	outliers	1 (+2ex)			
	mean (n)	2.0233			
	st.dev. (n)	0.02528			
	R(calc.)	0.0708			
	st.dev.(ISO6974-3:18)	0.02291			compare R(D1945:14) = 0.10
	R(ISO6974-3:18)	0.0642			compare R(ISO6974-3:00) = 0.0607

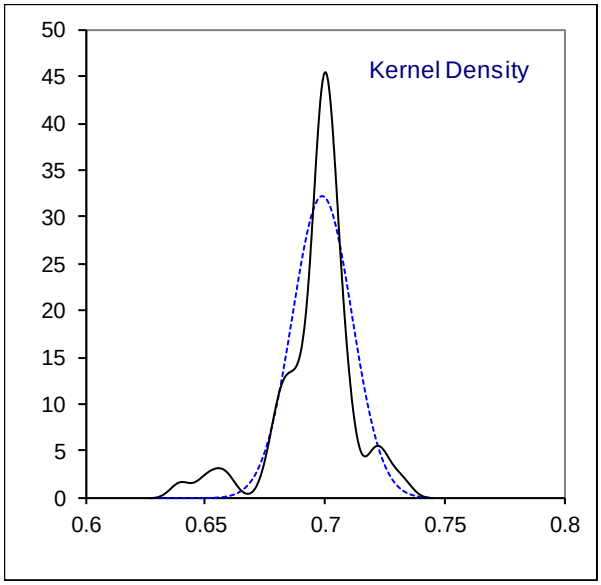

2.25
2.2
2.15
2.1
2.05
2
1.95
1.9
92 150 529 663 777 1081 1943 1006 1759 130 1085 1737 6177 444 1788 963 1489 1654 1679 6104 6237 449 1589 316 442 608 868 974 1029 1197 887 1388 6062 552 496 167 1203 1635 6203 360 352 611 609 840 823 6130 851 922 9145 862 151 1106 1198 600 781 610 574 6243 6234


Kernel Density
30
25
20
15
10
5
0
1.8
1.9
2
2.1
2.2
2.3

Determination of iso-Butane on sample #19060; results in %mol/mol

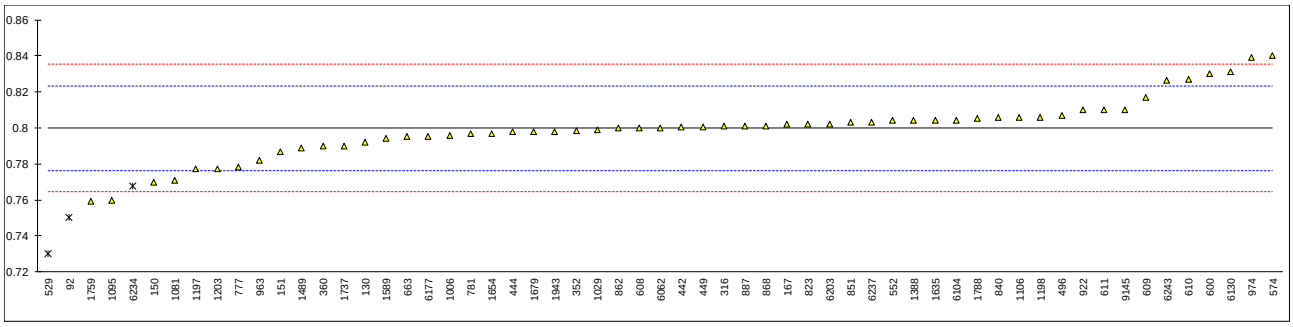
lab	method	value	mark	z(targ)	remarks
92	D2286	0.65	R(0.05)	-4.60	
130	ISO6974-3	0.689		-0.96	
150	D1945	0.66		-3.67	
151	GPA2261	0.70725		0.74	
167	GPA2261	0.7017		0.22	
225		-----		-----	
316	ISO6974-3	0.6988		-0.05	
352	ISO6974-3	0.7049	C	0.52	first reported: 0.6840
360	ISO6974-3	0.71		1.00	
442	D1945	0.7027		0.32	
444	D1945	0.6920		-0.68	
446		-----		-----	
449	ISO6974-3	0.7003		0.09	
496	EN15984	0.704		0.44	
525		-----		-----	
529	D1945	0.64	R(0.05)	-5.53	
552	D1945	0.703		0.34	
574	GPA2286	0.727		2.58	
593		-----		-----	
600	GPA2261	0.71		1.00	
608	GPA2261	0.69		-0.87	
609	GPA2261	0.6848		-1.35	
610	GPA2261	0.723		2.21	
611	GPA2261	0.70		0.07	
663	D1945	0.690	C	-0.87	first reported: 0.665
777	ISO6974-6	0.6853		-1.31	
781	GOST31371.1	0.6843		-1.40	
823	GPA2261	0.702		0.25	
840	GPA2286	0.7019		0.24	
851	GPA2261	0.706		0.62	
862	GPA2261	0.701		0.16	
868	GPA2261	0.701		0.16	
887	D1945	0.709		0.90	
922	GPA2261	0.72		1.93	
963	D1945	0.681		-1.71	
974	ISO6974-5	0.733		3.14	
1006	D1945	0.695	C	-0.40	first reported: 0.703
1029	D1945	0.697		-0.21	
1081	In house	0.677		-2.08	
1095	EN15984	0.68		-1.80	
1106	GPA2286	0.704		0.44	
1197	D1945	0.700		0.07	
1198	D1945	0.710		1.00	
1203		0.6839		-1.44	
1388	GPA2261	0.699		-0.03	
1489	ISO6974-3	0.700		0.07	
1589	D1945	0.698		-0.12	
1635	D1945	0.704		0.44	
1654	D1945	0.697		-0.21	
1679	ISO6974-3	0.697		-0.21	
1737	In house	0.70		0.07	
1759	ISO6974-5	0.682	C	-1.61	first reported: 0.718
1788	D7833	0.6976		-0.16	
1943	ISO6974-3	0.6925		-0.63	
6062	ISO6974-3	0.699		-0.03	
6104	GPA2261	0.701		0.16	
6105		-----		-----	
6130	GB/T13610	0.7043		0.47	
6177	GPA2261	0.698		-0.12	
6203	ISO6975	0.701		0.16	
6234	GPA2261	0.6556	ex,C	-4.08	excluded, see paragraph 4.1, first reported: 0.6814
6237	ISO6974-3	0.699		-0.03	
6243	EN15984	0.7217		2.09	
9145	GPA2261	0.70		0.07	
	normality	suspect			
	n	56			
	outliers	2 (+1ex)			
	mean (n)	0.6993			
	st.dev. (n)	0.01240			
	R(calc.)	0.0347			
	st.dev.(ISO6974-3:18)	0.01072			compare R(D1945:14) = 0.07
	R(ISO6974-3:18)	0.0300			compare R(ISO6974-3:00) = 0.0420

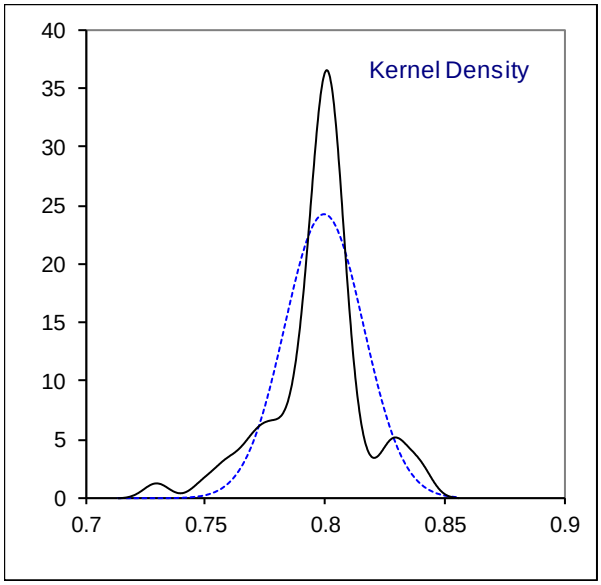

0.74
0.73
0.72
0.71
0.7
0.69
0.68
0.67
0.66
0.65
0.64
529 92 6234 150 1081 1095 963 1759 1203 781 609 777 130 608 663 444 1943 1006 1029 1654 1679 1788 1589 6177 316 1388 6062 6237 611 1197 1489 1737 9145 449 862 868 6104 6203 167 840 823 442 552 496 1106 1635 6130 352 851 151 887 360 600 1198 922 6243 610 574 974


Kernel Density
50
45
40
35
30
25
20
15
10
5
0
0.6
0.65
0.7
0.75
0.8

Determination of n-Butane on sample #19060; results in %mol/mol

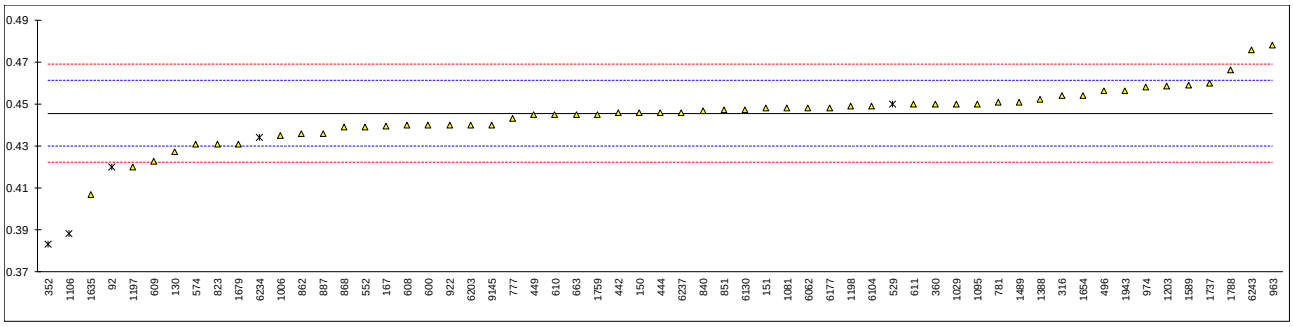
lab	method	value	mark	z(targ)	remarks
92	D2286	0.75	ex	-4.22	excluded, see paragraph 4.1
130	ISO6974-3	0.792		-0.66	
150	D1945	0.77	C	-2.53	first reported: 0.72
151	GPA2261	0.78675		-1.11	
167	GPA2261	0.8019		0.18	
225		-----		-----	
316	ISO6974-3	0.8008		0.08	
352	ISO6974-3	0.7983	C	-0.13	first reported: 0.7793
360	ISO6974-3	0.79		-0.83	
442	D1945	0.8006		0.07	
444	D1945	0.7979		-0.16	
446		-----		-----	
449	ISO6974-3	0.8006		0.07	
496	EN15984	0.807		0.61	
525		-----		-----	
529	D1945	0.73	R(0.05)	-5.92	
552	D1945	0.804		0.35	
574	GPA2286	0.840		3.41	
593		-----		-----	
600	GPA2261	0.83		2.56	
608	GPA2261	0.80		0.02	
609	GPA2261	0.8167		1.43	
610	GPA2261	0.827		2.30	
611	GPA2261	0.81		0.86	
663	D1945	0.795	C	-0.41	first reported: 0.750
777	ISO6974-6	0.7784		-1.81	
781	GOST31371.1	0.7966		-0.27	
823	GPA2261	0.802		0.19	
840	GPA2286	0.8059		0.52	
851	GPA2261	0.803		0.27	
862	GPA2261	0.800		0.02	
868	GPA2261	0.801		0.10	
887	D1945	0.801		0.10	
922	GPA2261	0.81		0.86	
963	D1945	0.782		-1.51	
974	ISO6974-5	0.839		3.32	
1006	D1945	0.796	C	-0.32	first reported: 0.805
1029	D1945	0.799		-0.07	
1081	In house	0.771		-2.44	
1095	EN15984	0.76		-3.37	
1106	GPA2286	0.806		0.52	
1197	D1945	0.777		-1.93	
1198	D1945	0.806		0.52	
1203		0.7772		-1.92	
1388	GPA2261	0.804		0.35	
1489	ISO6974-3	0.789		-0.92	
1589	D1945	0.794		-0.49	
1635	D1945	0.804		0.35	
1654	D1945	0.797		-0.24	
1679	ISO6974-3	0.798		-0.15	
1737	In house	0.79		-0.83	
1759	ISO6974-5	0.759	C	-3.46	first reported: 0.819
1788	D7833	0.805		0.44	
1943	ISO6974-3	0.798		-0.15	
6062	ISO6974-3	0.800		0.02	
6104	GPA2261	0.804		0.35	
6105		-----		-----	
6130	GB/T13610	0.8314		2.68	
6177	GPA2261	0.795		-0.41	
6203	ISO6975	0.802		0.19	
6234	GPA2261	0.7679	ex,C	-2.70	excluded, see paragraph 4.1, first reported: 0.7307
6237	ISO6974-3	0.803		0.27	
6243	EN15984	0.8264		2.25	
9145	GPA2261	0.81		0.86	
	normality	suspect			
	n	56			
	outliers	1 (+2ex)			
	mean (n)	0.7998			
	st.dev. (n)	0.01644			
	R(calc.)	0.0460			
	st.dev.(ISO6974-3:18)	0.01180			compare R(D1945:14) = 0.07
	R(ISO6974-3:18)	0.0330			compare R(ISO6974-3:00) = 0.0480

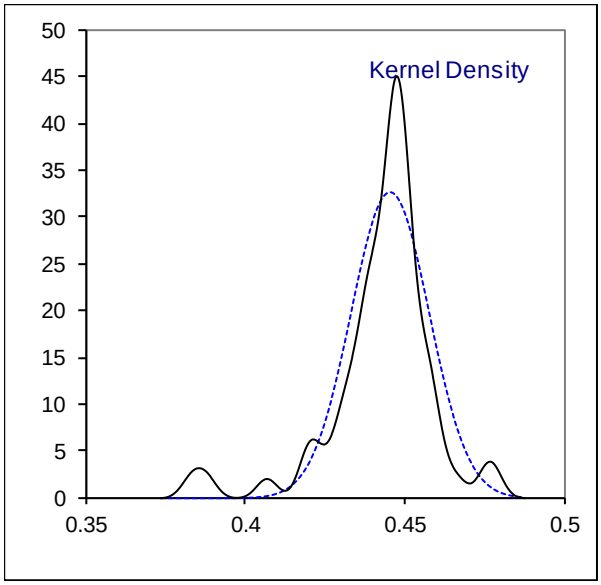

0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
529 92 1759 1095 6224 150 1081 1197 1203 777 963 151 1489 360 1737 130 1589 663 6177 1006 781 1654 444 1679 1943 352 1029 862 608 6062 442 449 316 887 868 167 823 6203 851 6237 552 1388 1635 6104 1788 840 1106 1198 496 922 611 9145 609 6243 610 600 6130 974 574


Kernel Density
40
35
30
25
20
15
10
5
0
0.7
0.75
0.8
0.85
0.9

Determination of Carbon dioxide on sample #19060; results in %mol/mol

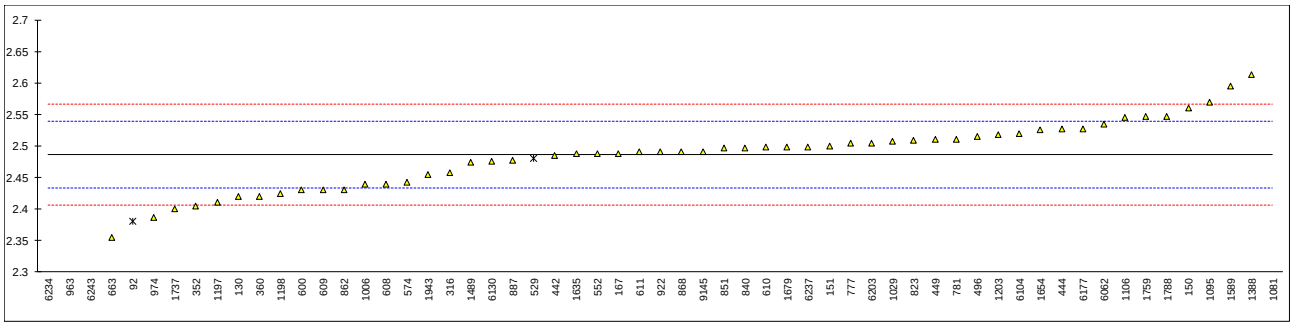
lab	method	value	mark	z(targ)	remarks
92	D2286	0.42	ex	-3.29	excluded, see paragraph 4.1
130	ISO6974-3	0.427		-2.39	
150	D1945	0.446		0.06	
151	GPA2261	0.4480		0.31	
167	GPA2261	0.4394		-0.79	
225		-----		-----	
316	ISO6974-3	0.4540		1.09	
352	ISO6974-3	0.3834	C,R(0.01)	-8.00	first reported: 0.4253
360	ISO6974-3	0.45		0.57	
442	D1945	0.4458		0.03	
444	D1945	0.4460	C	0.06	first reported: 0.3938
446		-----		-----	
449	ISO6974-3	0.4449		-0.09	
496	EN15984	0.456		1.34	
525		-----		-----	
529	D1945	0.45	ex	0.57	excluded, see paragraph 4.1
552	D1945	0.439		-0.85	
574	GPA2286	0.431		-1.88	
593		-----		-----	
600	GPA2261	0.44		-0.72	
608	GPA2261	0.44		-0.72	
609	GPA2261	0.4225		-2.97	
610	GPA2261	0.445		-0.07	
611	GPA2261	0.45		0.57	
663	D1945	0.445		-0.07	
777	ISO6974-6	0.443		-0.33	
781	GOST31371.1	0.4506		0.65	
823	GPA2261	0.431		-1.88	
840	GPA2286	0.4465		0.12	
851	GPA2261	0.447		0.19	
862	GPA2261	0.436		-1.23	
868	GPA2261	0.439		-0.85	
887	D1945	0.436		-1.23	
922	GPA2261	0.44		-0.72	
963	D1945	0.478		4.18	
974	ISO6974-5	0.458		1.60	
1006	D1945	0.435	C	-1.36	first reported: 0.437
1029	D1945	0.450		0.57	
1081	In house	0.448		0.31	
1095	EN15984	0.45		0.57	
1106	GPA2286	0.388	R(0.01)	-7.41	
1197	D1945	0.420		-3.29	
1198	D1945	0.449		0.44	
1203		0.4585		1.67	
1388	GPA2261	0.452		0.83	
1489	ISO6974-3	0.451		0.70	
1589	D1945	0.459		1.73	
1635	D1945	0.407		-4.97	
1654	D1945	0.454		1.09	
1679	ISO6974-3	0.431		-1.88	
1737	In house	0.46		1.86	
1759	ISO6974-5	0.445	C	-0.07	first reported: 0.442
1788	D7833	0.4662		2.66	
1943	ISO6974-3	0.4561		1.36	
6062	ISO6974-3	0.448		0.31	
6104	GPA2261	0.449		0.44	
6105		-----		-----	
6130	GB/T13610	0.4471		0.20	
6177	GPA2261	0.448		0.31	
6203	ISO6975	0.440		-0.72	
6234	GPA2261	0.4342	ex,C	-1.46	excluded, see paragraph 4.1, first reported: 1.0613
6237	ISO6974-3	0.446		0.06	
6243	EN15984	0.4758		3.89	
9145	GPA2261	0.44		-0.72	
	normality	not OK			
	n	54			
	outliers	2 (+3ex)			
	mean (n)	0.4456			
	st.dev. (n)	0.01223			
	R(calc.)	0.0342			
	st.dev.(ISO6974-3:18)	0.00777			compare R(D1945:14) = 0.07
	R(ISO6974-3:18)	0.0217			compare R(ISO6974-3:00) = 0.0267

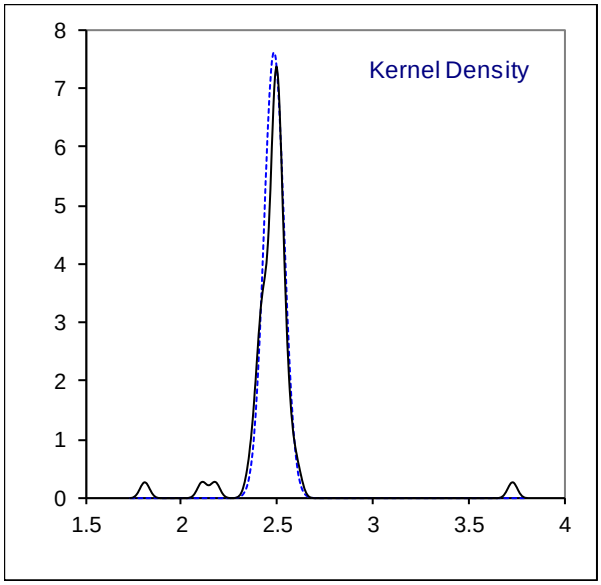

0.49
0.47
0.45
0.43
0.41
0.39
0.37
352 1106 1635 92 1197 609 130 574 823 1679 6234 1006 862 887 868 552 167 608 600 922 6203 9145 777 449 610 663 1759 442 150 444 6237 840 851 6130 151 1081 6062 6177 1198 6104 529 611 360 1029 1095 781 1489 1388 316 1654 496 1943 974 1203 1589 1737 1788 6243 963


Kernel Density
50
45
40
35
30
25
20
15
10
5
0
0.35
0.4
0.45
0.5

Determination of Nitrogen on sample #19060; results in %mol/mol

lab	method	value	mark	z(targ)	remarks
92	D2286	2.38	ex	-3.99	excluded, see paragraph 4.1
130	ISO6974-3	2.419		-2.52	
150	D1945	2.56		2.79	
151	GPA2261	2.49925		0.50	
167	GPA2261	2.4882		0.09	
225		-----		-----	
316	ISO6974-3	2.4578		-1.06	
352	ISO6974-3	2.4053	C	-3.04	first reported: 2.0504
360	ISO6974-3	2.42		-2.48	
442	D1945	2.4841		-0.07	
444	D1945	2.5265		1.53	
446		-----		-----	
449	ISO6974-3	2.5098		0.90	
496	EN15984	2.515		1.09	
525		-----		-----	
529	D1945	2.48	ex	-0.22	excluded, see paragraph 4.1
552	D1945	2.488		0.08	
574	GPA2286	2.442		-1.66	
593		-----		-----	
600	GPA2261	2.43		-2.11	
608	GPA2261	2.44		-1.73	
609	GPA2261	2.4301		-2.10	
610	GPA2261	2.498		0.45	
611	GPA2261	2.49		0.15	
663	D1945	2.355	C	-4.93	first reported: 2.330
777	ISO6974-6	2.505		0.72	
781	GOST31371.1	2.511		0.94	
823	GPA2261	2.509		0.87	
840	GPA2286	2.4964		0.39	
851	GPA2261	2.496		0.38	
862	GPA2261	2.431		-2.07	
868	GPA2261	2.490		0.15	
887	D1945	2.477		-0.34	
922	GPA2261	2.49		0.15	
963	D1945	2.112	R(0.01)	-14.09	
974	ISO6974-5	2.386		-3.76	
1006	D1945	2.439	C	-1.77	first reported: 2.472
1029	D1945	2.507		0.79	
1081	In house	3.728	R(0.01)	46.79	
1095	EN15984	2.57		3.17	
1106	GPA2286	2.545		2.22	
1197	D1945	2.410		-2.86	
1198	D1945	2.424		-2.33	
1203		2.5185		1.23	
1388	GPA2261	2.613		4.79	
1489	ISO6974-3	2.474		-0.45	
1589	D1945	2.595		4.11	
1635	D1945	2.487		0.04	
1654	D1945	2.525		1.47	
1679	ISO6974-3	2.498		0.45	
1737	In house	2.40		-3.24	
1759	ISO6974-5	2.546	C	2.26	first reported: 2.542
1788	D7833	2.5466		2.29	
1943	ISO6974-3	2.4549		-1.17	
6062	ISO6974-3	2.535		1.85	
6104	GPA2261	2.520		1.28	
6105		-----		-----	
6130	GB/T13610	2.4762		-0.37	
6177	GPA2261	2.527		1.55	
6203	ISO6975	2.505		0.72	
6234	GPA2261	1.8129	C,R(0.01)	-25.35	first reported: 1.5487
6237	ISO6974-3	2.499		0.49	
6243	EN15984	2.179	R(0.01)	-11.56	
9145	GPA2261	2.49		0.15	
	normality	OK			
	n	53			
	outliers	4 (+2ex)			
	mean (n)	2.4859			
	st.dev. (n)	0.05236			
	R(calc.)	0.1466			
	st.dev.(ISO6974-3:18)	0.02655			compare R(D1945:14) = 0.10
	R(ISO6974-3:18)	0.0743			compare R(ISO6974-3:00) = 0.0746

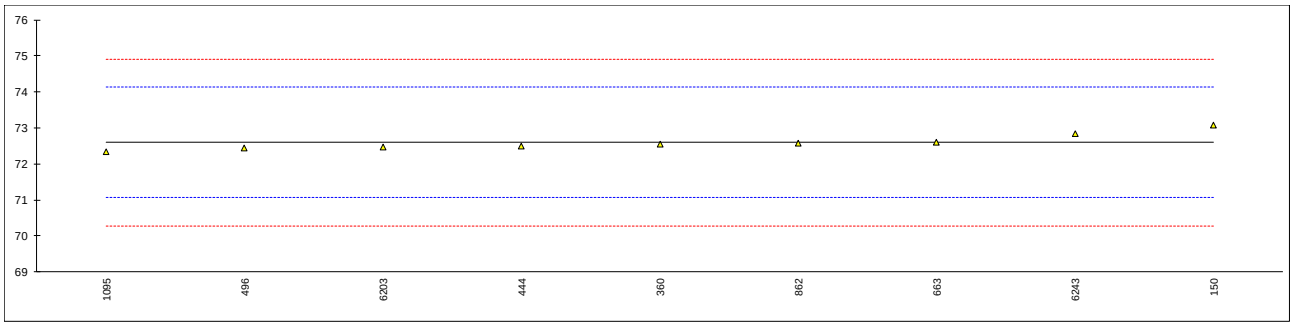

2.7
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
6234 963 6243 663 92 974 1737 352 1197 130 360 1198 600 609 862 1006 608 574 1943 316 1489 6130 887 529 442 1635 552 167 611 922 868 9145 851 840 610 1679 6237 151 777 6203 1029 823 449 781 496 1203 6104 1654 444 6177 6062 1106 1759 1788 150 1095 1589 1388 1081

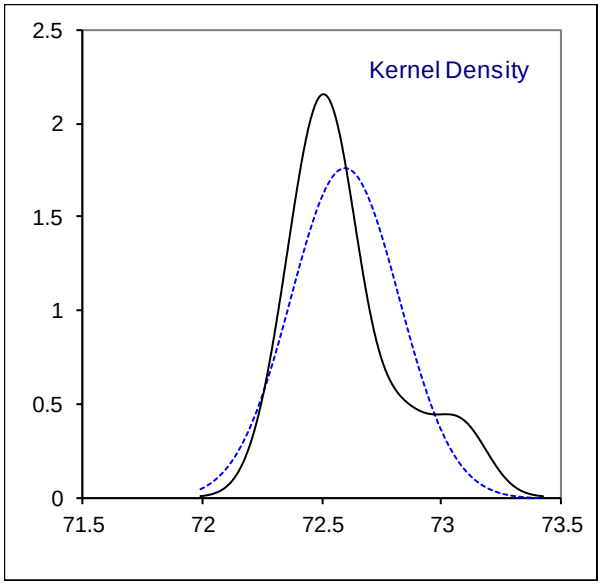

Kernel Density
8
7
6
5
4
3
2
1
0
1.5
2
2.5
3
3.5
4

Determination of Carbon content on sample #19060; results in g/100g

lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	EN15984	73.08		0.62	
151		-----		-----	
167		-----		-----	
225		-----		-----	
316		-----		-----	
352		-----		-----	
360	EN15984	72.56		-0.05	
442		-----		-----	
444	EN15984	72.49		-0.14	
446		-----		-----	
449		-----		-----	
496	EN15984	72.446		-0.20	
525		-----		-----	
529		-----		-----	
552		-----		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	EN15984	72.604	C	0.01	first reported: 72.61
777		-----		-----	
781		-----		-----	
823		-----		-----	
840		-----		-----	
851		-----		-----	
862	GPA2261	72.57		-0.04	
868		-----		-----	
887		-----		-----	
922		-----		-----	
963		-----		-----	
974		-----		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095	EN15984	72.340		-0.33	
1106		-----		-----	
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388		-----		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654		-----		-----	
1679		-----		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943		-----		-----	
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130		-----		-----	
6177		-----		-----	
6203	EN15984	72.46		-0.18	
6234		-----		-----	
6237		-----		-----	
6243	EN15984	72.8351		0.31	
9145		-----		-----	

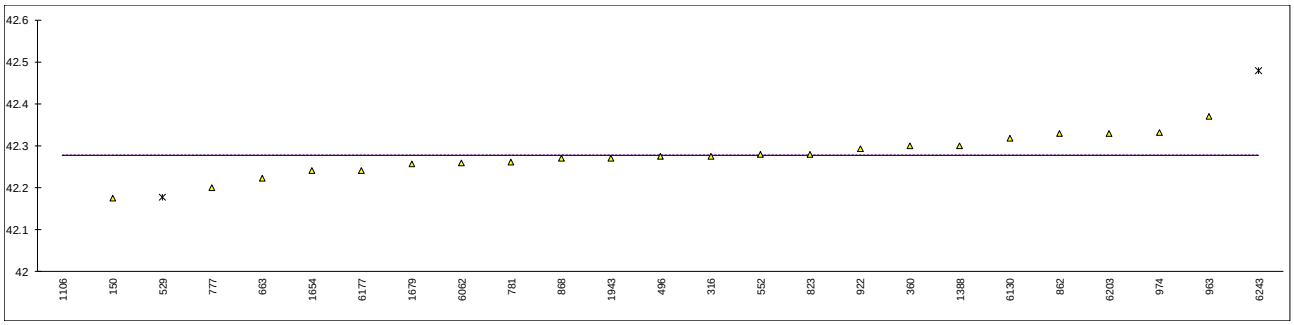
normality	not OK
n	9
outliers	0
mean (n)	72.598
st.dev. (n)	0.2267
R(calc.)	0.635
st.dev.(EN15984:17)	0.7714
R(EN15984:17)	2.16

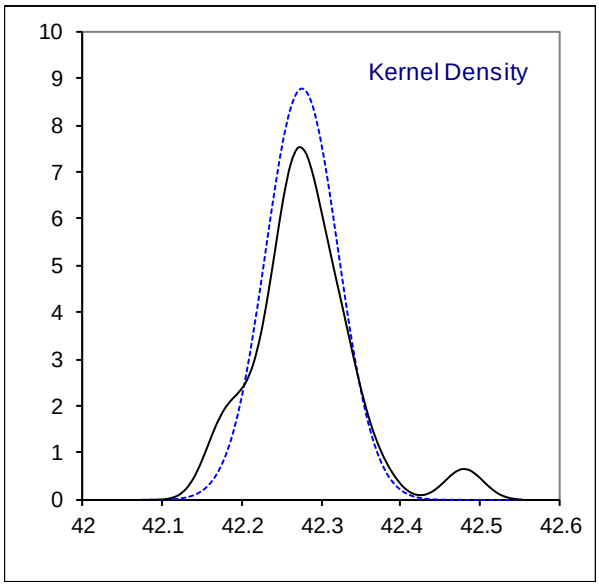

76
75
74
73
72
71
70
69
1085
496
6203
444
360
862
663
6243
150


Kernel Density
2.5
2
1.5
1
0.5
0
71.5
72
72.5
73
73.5

Determination of Caloric Value Superior or Gross Caloric Value (Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C) on sample #19060; results in MJ/m^3

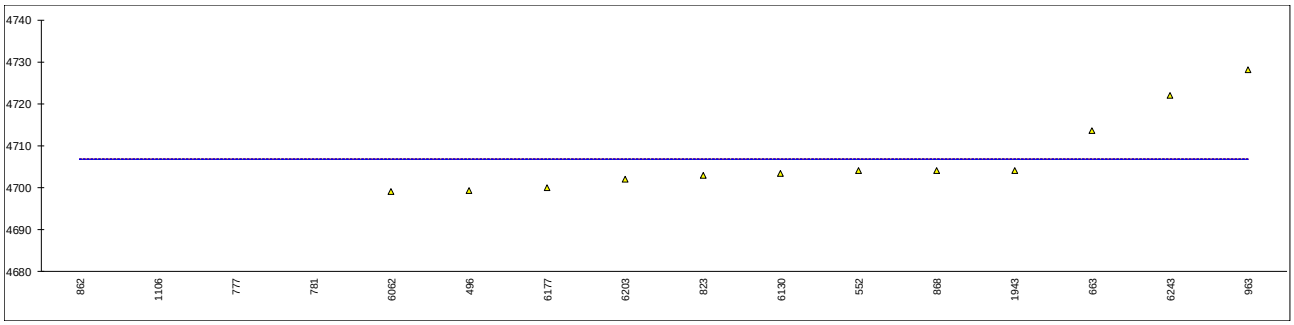
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	ISO6976	42.174	C	-----	first reported: 42.050
151		-----		-----	
167		-----		-----	
225		-----		-----	
316	ISO6976	42.2745		-----	
352		-----		-----	
360	ISO6976	42.30		-----	
442		-----		-----	
444		-----		-----	
446		-----		-----	
449		-----		-----	
496	DIN51857	42.2745		-----	
525		-----		-----	
529	ISO6976	42.1778	ex, E	-----	excluded, see paragraph 4.1, iis calc. 42.069
552	ISO6976	42.28		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	42.223	C	-----	first reported: 42.180
777	GOST31369	42.20		-----	
781	GOST31369	42.26		-----	
823	ISO6976	42.280		-----	
840		-----		-----	
851		-----		-----	
862	ISO6976	42.33		-----	
868	ISO6976	42.27		-----	
887		-----		-----	
922	ISO6976	42.2939		-----	
963	ISO6976	42.37		-----	
974	GPA2172	42.331	C, E	-----	first reported: 42.481, iis calc. 42.369
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	40.23601991	R(0.01), E	-----	iis calc. 42.527
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388	ISO6976	42.30		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654	ISO6976	42.240		-----	
1679	ISO6976	42.256		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943	ISO6976	42.27		-----	
6062	ISO6976	42.258		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	42.3170		-----	
6177	ISO6976	42.24		-----	
6203	ISO6976	42.33	E	-----	iis calc. 42.266
6234		-----		-----	
6237		-----		-----	
6243	EN15984	42.4798	R(0.01)	-----	
9145		-----		-----	
	normality	OK			
	n	22			
	outliers	2 (+1ex)			
	mean (n)	42.2760			
	st.dev. (n)	0.045521			
	R(calc.)	0.1275			Compare R(iis18S01M) = 0.2565

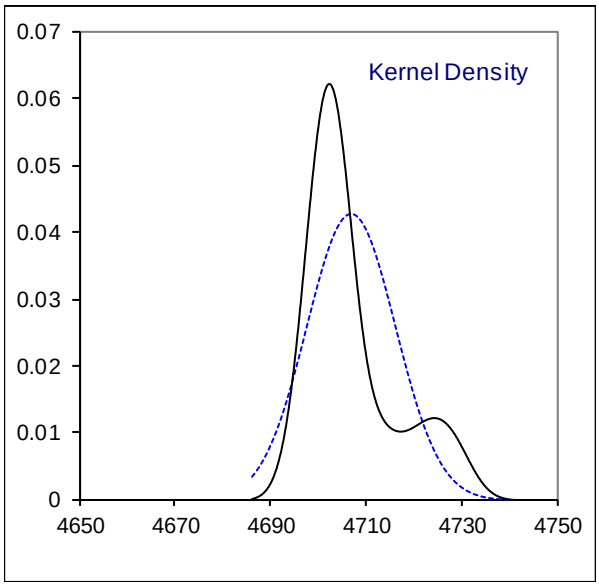

42.6
42.5
42.4
42.3
42.2
42.1
42
1106
150
529
777
663
1654
6177
1679
6062
781
868
1943
496
316
552
823
922
360
1388
6130
862
6203
974
963
6243


Kernel Density
10
9
8
7
6
5
4
3
2
1
0
42
42.1
42.2
42.3
42.4
42.5
42.6

Determination of Caloric Value Inferior or Net Caloric Value (Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C) on sample #19060; results in kJ/100g

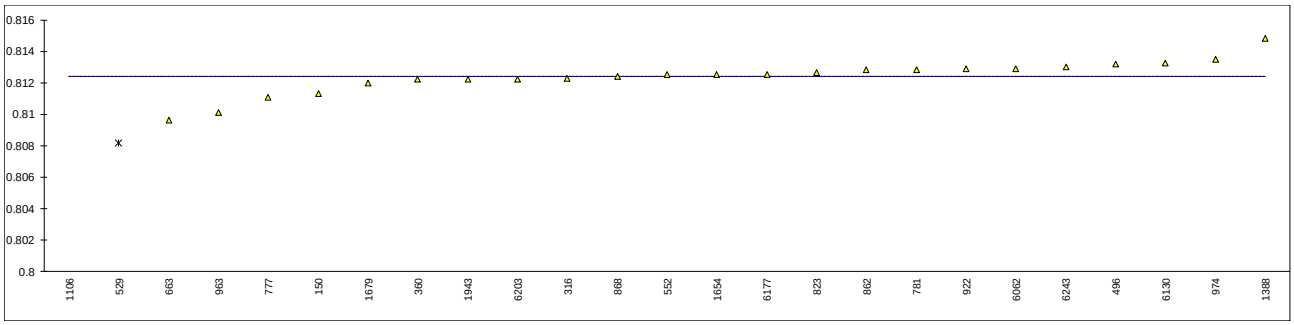
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150		-----		-----	
151		-----		-----	
167		-----		-----	
225		-----		-----	
316		-----		-----	
352		-----		-----	
360		-----		-----	
442		-----		-----	
444		-----		-----	
446		-----		-----	
449		-----		-----	
496	DIN51857	4699.2922		-----	
525		-----		-----	
529		-----		-----	
552	ISO6976	4704		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	4713.589	C	-----	first reported: 4715.96
777	GOST31369	38.14	ex	-----	excluded (probably a unit error?), iis calc. 4702.35 kJ/100 g / 38.14 MJ/m^3
781	GOST31369	38.20	ex	-----	excluded (probably a unit error?), iis calc. 4700.47 kJ/100 g / 38.20 MJ/m^3
823	ISO6976	4703.0		-----	
840		-----		-----	
851		-----		-----	
862	ISO6976	4.708	G(0.01), E	-----	iis calculated: 4708.04 KJ/100 g (possibly a unit error?)
868	ISO6976	4704		-----	
887		-----		-----	
922		-----		-----	
963	ISO6976	4728		-----	
974		-----		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	36.33960225	ex, E	-----	excluded, see paragraph 4.1, iis calc. 4705.78 kJ/100 g / 38.44 MJ/m^3
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388		-----		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654		-----		-----	
1679		-----		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943	ISO6976	4704.1		-----	
6062	ISO6976	4699.10		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	4703.3		-----	
6177	ISO6976	4700		-----	
6203	EN15984	4702		-----	
6234		-----		-----	
6237		-----		-----	
6243	EN15984	4722		-----	
9145		-----		-----	
	normality	not OK			
	n	12			
	outliers	1 (+3ex)			
	mean (n)	4706.865			
	st.dev. (n)	9.3474			
	R(calc.)	26.173			Compare R(iis18S01M) = 29.933

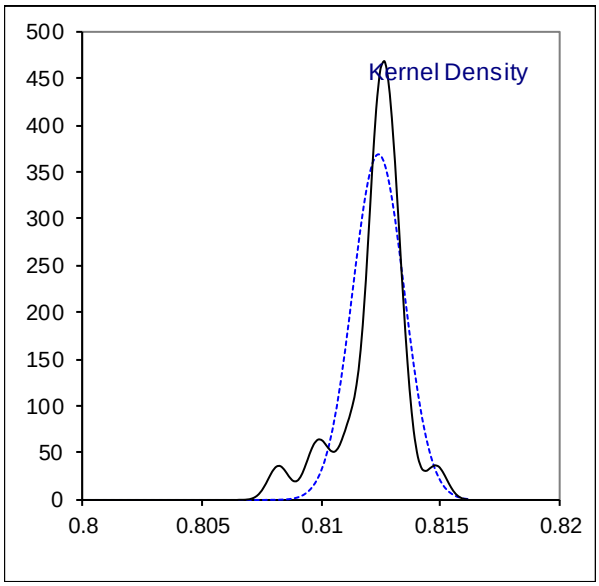

4740
4730
4720
4710
4700
4690
4680
862
1106
777
781
6062
496
6177
6203
823
6130
552
868
1943
663
6243
963


Kernel Density
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
4650
4670
4690
4710
4730
4750

Determination of Density (Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C) on sample #19060; results in kg/m^3

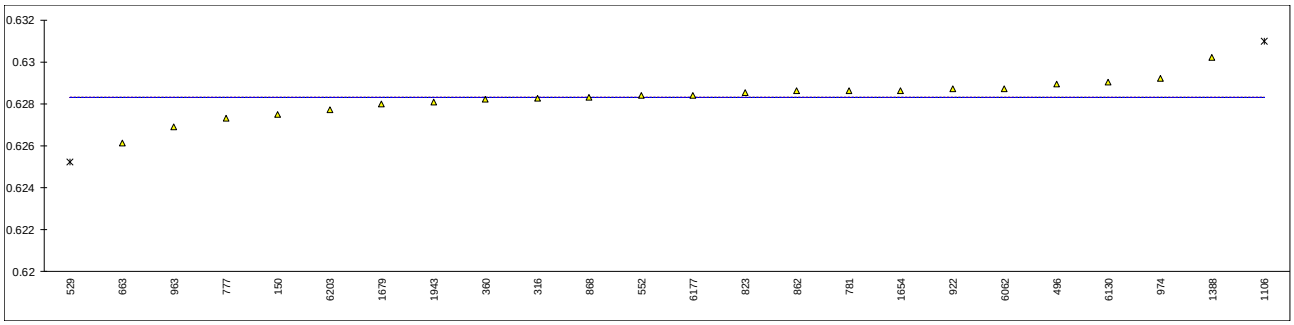
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	ISO6976	0.8113	C	-----	first reported: 0.8088
151		-----		-----	
167		-----		-----	
225		-----		-----	
316	ISO6976	0.81230		-----	
352		-----		-----	
360	ISO6976	0.8122		-----	
442		-----		-----	
444		-----		-----	
446		-----		-----	
449		-----		-----	
496	DIN51857	0.813178		-----	
525		-----		-----	
529	ISO6976	0.8082	ex	-----	excluded, see paragraph 4.1
552	ISO6976	0.8125		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	0.80965	C	-----	first reported: 0.80838
777	GOST31369	0.8111		-----	
781	GOST31369	0.8128		-----	
823	ISO6976	0.81265		-----	
840		-----		-----	
851		-----		-----	
862	ISO6976	0.8128		-----	
868	ISO6976	0.8124		-----	
887		-----		-----	
922	ISO6976	0.8129		-----	
963	ISO6976	0.8101		-----	
974	GPA2172	0.8135		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	0.7730	R(0.01), E	-----	iis calc. 0.81696
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388	ISO6976	0.8148		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654	ISO6976	0.8125		-----	
1679	ISO6976	0.8120		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943	ISO6976	0.8122		-----	
6062	ISO6976	0.8129		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	0.81326		-----	
6177	ISO6976	0.8125		-----	
6203	ISO6976	0.8122		-----	
6234		-----		-----	
6237		-----		-----	
6243	EN15984	0.813		-----	
9145		-----		-----	
	normality	suspect			
	n	23			
	outliers	1 (+1ex)			
	mean (n)	0.81238			
	st.dev. (n)	0.001079			
	R(calc.)	0.00302			Compare R(iis18S01M) = 0.00384

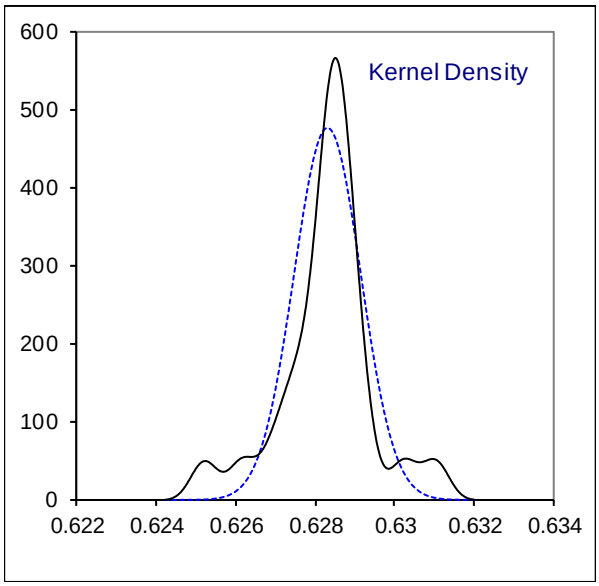

0.816
0.814
0.812
0.81
0.808
0.806
0.804
0.802
0.8
1106
529
663
963
777
150
1679
360
1943
6203
316
868
552
1654
6177
823
862
781
922
6062
6243
496
6130
974
1388


Kernel Density
500
450
400
350
300
250
200
150
100
50
0
0.8
0.805
0.81
0.815
0.82

Determination of Relative Density (Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C) on sample #19060; results have no unit

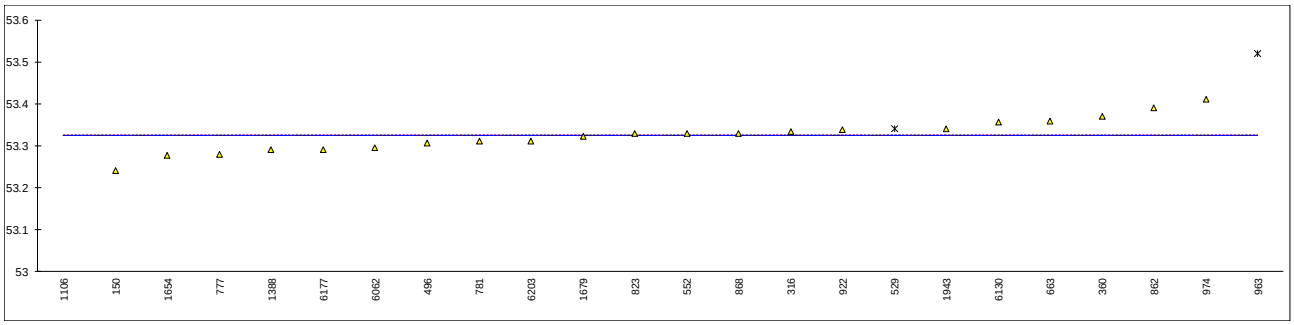
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	ISO6976	0.6275	C	-----	first reported: 0.6256
151		-----		-----	
167		-----		-----	
225		-----		-----	
316	ISO6976	0.62828	C	-----	first reported: 0.64942
352		-----		-----	
360	ISO6976	0.6282		-----	
442		-----		-----	
444		-----		-----	
446		-----		-----	
449		-----		-----	
496	DIN51857	0.628946		-----	
525		-----		-----	
529	ISO6976	0.6252	ex	-----	excluded, see paragraph 4.1
552	ISO6976	0.6284		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	0.62615	C	-----	first reported: 0.62517
777	GOST31369	0.6273		-----	
781	GOST31369	0.6286		-----	
823	ISO6976	0.62854		-----	
840		-----		-----	
851		-----		-----	
862	ISO6976	0.6286		-----	
868	ISO6976	0.6283		-----	
887		-----		-----	
922	ISO6976	0.6287		-----	
963	ISO6976	0.6269		-----	
974	GPA2172	0.6292		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	0.6310	ex	-----	excluded, see paragraph 4.1
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388	ISO6976	0.6302		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654	ISO6976	0.6286		-----	
1679	ISO6976	0.6280		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943	ISO6976	0.6281		-----	
6062	ISO6976	0.62873		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	0.62901		-----	
6177	ISO6976	0.6284		-----	
6203	ISO6976	0.6277		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		-----		-----	
	normality	suspect			
	n	22			
	outliers	0 (+2ex)			
	mean (n)	0.62829			
	st.dev. (n)	0.000838			
	R(calc.)	0.00235			Compare R(iis18S01M) = 0.00315

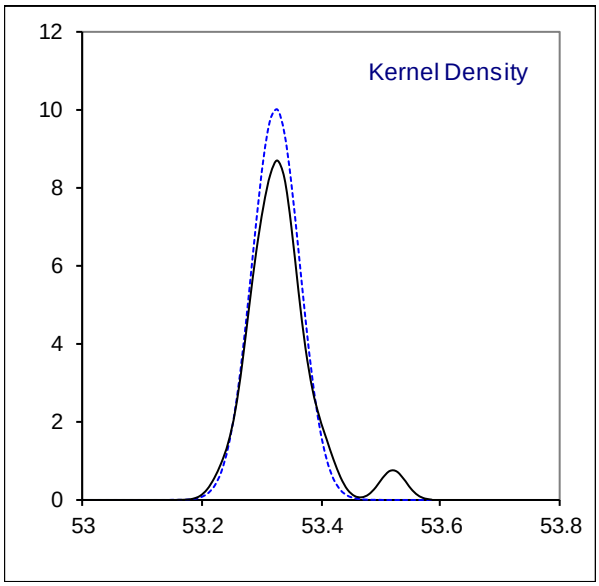

0.632
0.63
0.628
0.626
0.624
0.622
0.62
529
663
963
777
150
6203
1679
1943
360
316
868
552
6177
823
862
781
1654
922
6062
496
6130
974
1388
1106


600
500
400
300
200
100
0
Kernel Density
0.622
0.624
0.626
0.628
0.63
0.632
0.634

Determination of Wobbe Index (Real Gas, 101.325 kPa, combustion temperature 25°C, metering temperature 0°C) on sample #19060; results in MJ/m^3

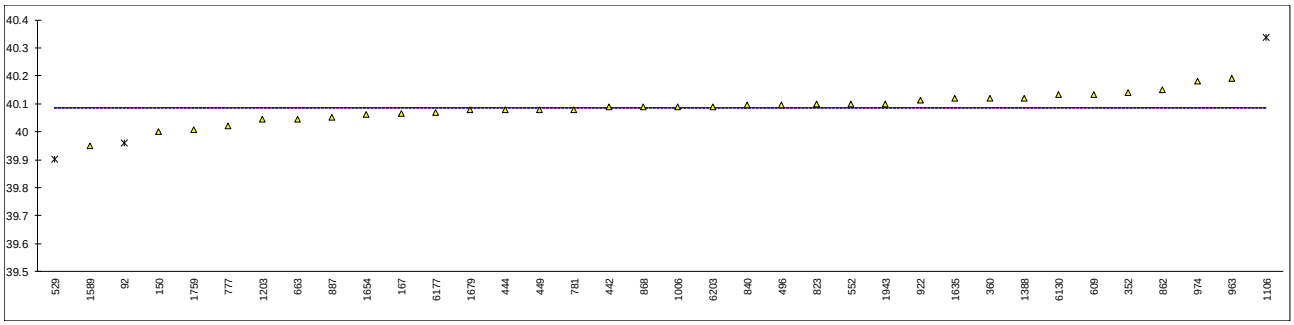
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	ISO6976	53.241	C	-----	first reported: 53.165
151		-----		-----	
167		-----		-----	
225		-----		-----	
316	ISO6976	53.3343		-----	
352		-----		-----	
360	ISO6976	53.37		-----	
442		-----		-----	
444		-----		-----	
446		-----		-----	
449		-----		-----	
496	DIN51857	53.3054		-----	
525		-----		-----	
529	ISO6976	53.34	ex, E	-----	excluded see paragraph 4.1, iis calc. 53.211
552	ISO6976	53.33		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	53.359	C	-----	first reported: 53.346
777	GOST31369	53.28		-----	
781	GOST31369	53.31		-----	
823	ISO6976	53.329		-----	
840		-----		-----	
851		-----		-----	
862	ISO6976	53.39		-----	
868	ISO6976	53.33		-----	
887		-----		-----	
922	ISO6976	53.3392		-----	
963	ISO6976	53.52	R(0.01)	-----	
974	GPA2172	53.41	C	-----	first reported: 53.56
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	50.6524	R(0.01), E	-----	iis calc. 53.503
1197		-----		-----	
1198		-----		-----	
1203		-----		-----	
1388	ISO6976	53.29		-----	
1489		-----		-----	
1589		-----		-----	
1635		-----		-----	
1654	ISO6976	53.277		-----	
1679	ISO6976	53.323		-----	
1737		-----		-----	
1759		-----		-----	
1788		-----		-----	
1943	ISO6976	53.34		-----	
6062	ISO6976	53.294		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	53.3563		-----	
6177	ISO6976	53.29		-----	
6203	ISO6976	53.31		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		-----		-----	
	normality	OK			
	n	21			
	outliers	2 (+1ex)			
	mean (n)	53.3242			
	st.dev. (n)	0.03988			
	R(calc.)	0.1117			Compare R(iis18S01M) = 0.2927

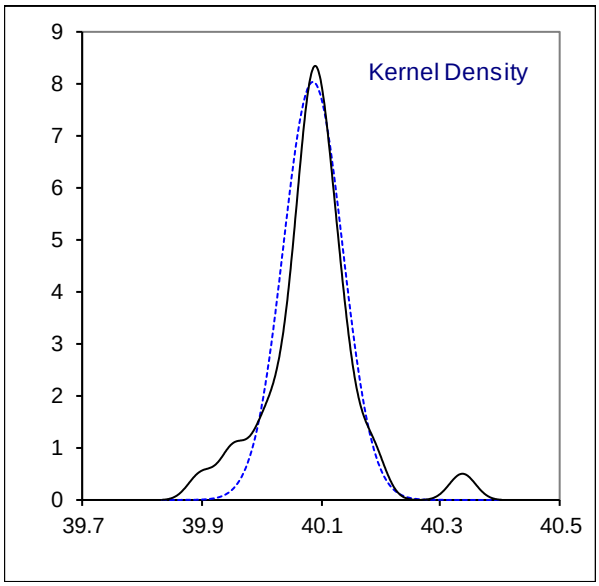

53.6
53.5
53.4
53.3
53.2
53.1
53
1106
150
1654
777
1388
6177
6062
496
781
6203
1679
823
552
868
316
922
529
1943
6130
663
360
862
974
963


Kernel Density
12
10
8
6
4
2
0
53
53.2
53.4
53.6
53.8

Determination of Caloric Value Superior or Gross Caloric Value (Real Gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C) on sample #19060; results in MJ/m^3

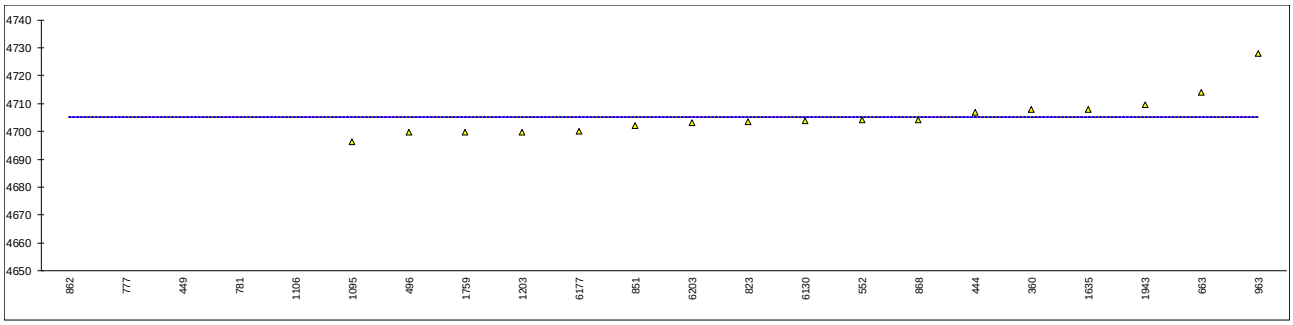
lab	method	value	mark	z(targ)	remarks
92	ISO6976	39.96	ex	-----	excluded, see paragraph 4.1
130		-----		-----	
150	ISO6976	39.999	C	-----	first reported: 39.881
151		-----		-----	
167	GPA2261	40.0659	E	-----	iis calc. 40.094
225		-----		-----	
316		-----		-----	
352	ISO6976	40.14	C	-----	first reported: 40.21
360	ISO6976	40.12		-----	
442	ISO6976	40.09		-----	
444	ISO6976	40.078		-----	
446		-----		-----	
449	ISO6976	40.08		-----	
496	DIN51857	40.0942		-----	
525		-----		-----	
529	ISO6976	39.9006	ex	-----	excluded, see paragraph 4.1
552	ISO6976	40.10		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609	ISO6976	40.1324	E	-----	iis calc. 40.118
610		-----		-----	
611		-----		-----	
663	ISO6976	40.046	C	-----	first reported: 40.004
777	GOST31369	40.02		-----	
781	GOST31369	40.08		-----	
823	ISO6976	40.100		-----	
840	ISO6976	40.094		-----	
851		-----		-----	
862	ISO6976	40.15		-----	
868	ISO6976	40.09		-----	
887	D3588	40.05	E	-----	iis calc. 40.100
922	ISO6976	40.1126		-----	
963	ISO6976	40.19		-----	
974	GPA2172	40.18		-----	
1006	ISO6976	40.09	C	-----	first reported: 37.78
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	40.3368620652	R(0.01)	-----	
1197		-----		-----	
1198		-----		-----	
1203	ISO6976	40.0456		-----	
1388	ISO6976	40.12		-----	
1489		-----		-----	
1589	D3588	39.94915	E	-----	iis calc. 40.027
1635	ISO6976	40.118		-----	
1654	ISO6976	40.061		-----	
1679	ISO6976	40.077		-----	
1737		-----		-----	
1759	ISO6976	40.0072	C	-----	first reported: 40.1577
1788		-----		-----	
1943	ISO6976	40.1		-----	
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	40.1319		-----	
6177	ISO6976	40.07		-----	
6203	ISO6976	40.09		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		-----		-----	
	normality	suspect			
	n	33			
	outliers	1 (+2ex)			
	mean (n)	40.0870			
	st.dev. (n)	0.04956			
	R(calc.)	0.1388			Compare R(iis18S01M) = 0.1949

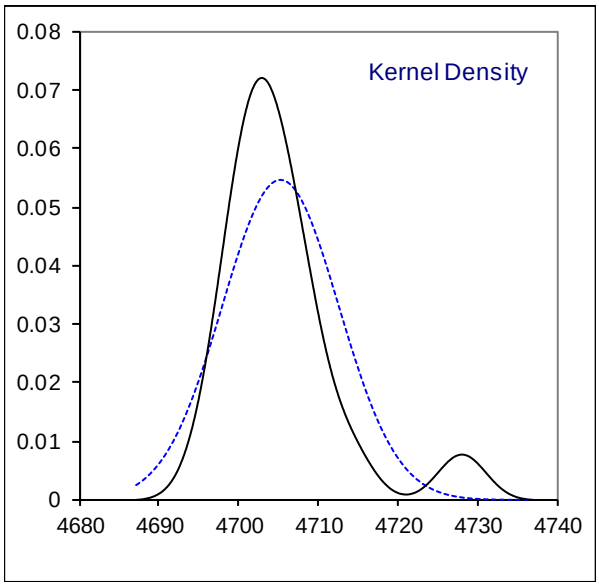

40.4
40.3
40.2
40.1
40
39.9
39.8
39.7
39.6
39.5
529
1589
92
150
1759
777
1203
663
887
1654
167
6177
1679
444
449
781
442
868
1006
6203
840
496
823
552
1943
922
1635
360
1388
6130
609
352
862
974
963
1106


Kernel Density
9
8
7
6
5
4
3
2
1
0
39.7
39.9
40.1
40.3
40.5

Determination of Caloric Value Inferior or Net Caloric Value (Real Gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C) on sample #19060; results in kJ/100g

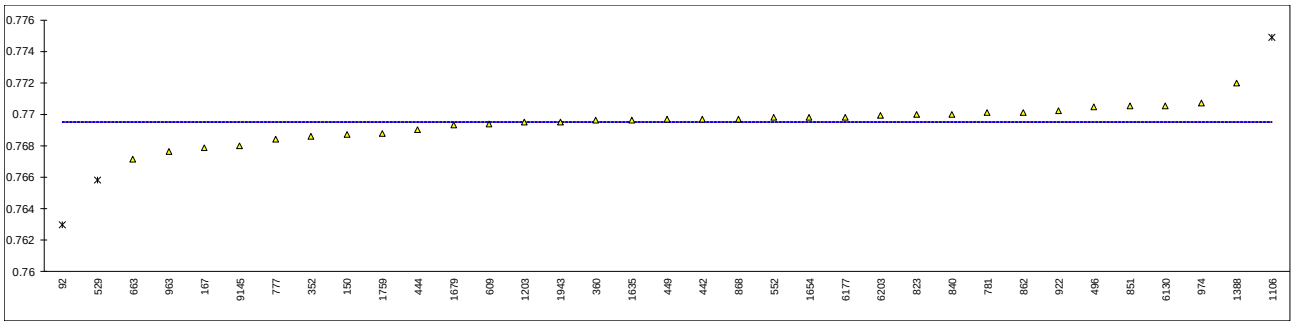
lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150		-----		-----	
151		-----		-----	
167		-----		-----	
225		-----		-----	
316		-----		-----	
352		-----		-----	
360	EN15984	4707.73		-----	
442		-----		-----	
444	EN15984	4706.69	E	-----	iis calc. 4700.68
446		-----		-----	
449	ISO6976	36.20	ex	-----	excluded (probably a unit error?), iis calc. 4701.87 kJ/100 g or 36.19 MJ/m^3
496	DIN51857	4699.5652		-----	
525		-----		-----	
529		-----		-----	
552	ISO6976	4704		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609		-----		-----	
610		-----		-----	
611		-----		-----	
663	EN15984	4713.938	C	-----	first reported: 4716.306
777	GOST31369	36.14	ex	-----	excluded (probably a unit error?), iis calc. 4702.90 kJ/100 g or 36.14 MJ/m^3
781	GOST31369	36.20	ex	-----	excluded (probably a unit error?), iis calc. 4701.02 kJ/100 g or 36.20 MJ/m^3
823	ISO6976	4703.5		-----	
840		-----		-----	
851	ISO6976	4702		-----	
862	ISO6976	4.708	G(0.01), E	-----	iis calc. 4708.59 (possibly a unit error?)
868	ISO6976	4704		-----	
887		-----		-----	
922		-----		-----	
963	ISO6976	4728		-----	
974		-----		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095	EN15984	4696.140	E	-----	iis calc. 4697.17
1106	GPA2286	36.4306789474	ex	-----	excluded, see paragraph 4.1, iis calc. 4709.34 kJ/100 g or 36.43 MJ/m^3
1197		-----		-----	
1198		-----		-----	
1203	ISO6976	4699.79		-----	
1388		-----		-----	
1489		-----		-----	
1589		-----		-----	
1635	ISO6976	4707.8		-----	
1654		-----		-----	
1679		-----		-----	
1737		-----		-----	
1759	ISO6976	4699.65	C	-----	first reported: 4699.19
1788		-----		-----	
1943	ISO6976	4709.449	E	-----	iis calc. 4704.70
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	4703.9		-----	
6177	ISO6976	4700		-----	
6203	ISO6976	4703		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		-----		-----	
	normality	not OK			
	n	17			
	outliers	1 (+4ex)			
	mean (n)	4705.245			
	st.dev. (n)	7.3019			
	R(calc.)	20.445			Compare R(iis18S01M) = 59.032

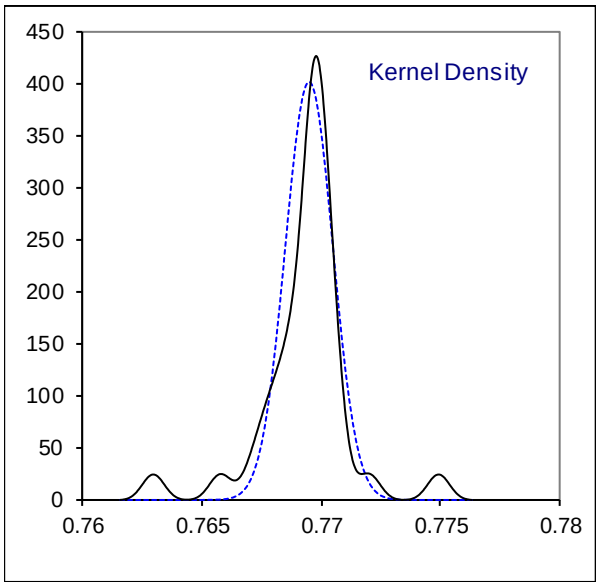

4740
4730
4720
4710
4700
4690
4680
4670
4660
4650
862
777
449
781
1106
1095
496
1759
1203
6177
851
6203
823
6130
552
868
444
360
1635
1943
663
963


Kernel Density
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
4680
4690
4700
4710
4720
4730
4740

Determination of Density (Real Gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C) on sample #19060; results in kg/m^3

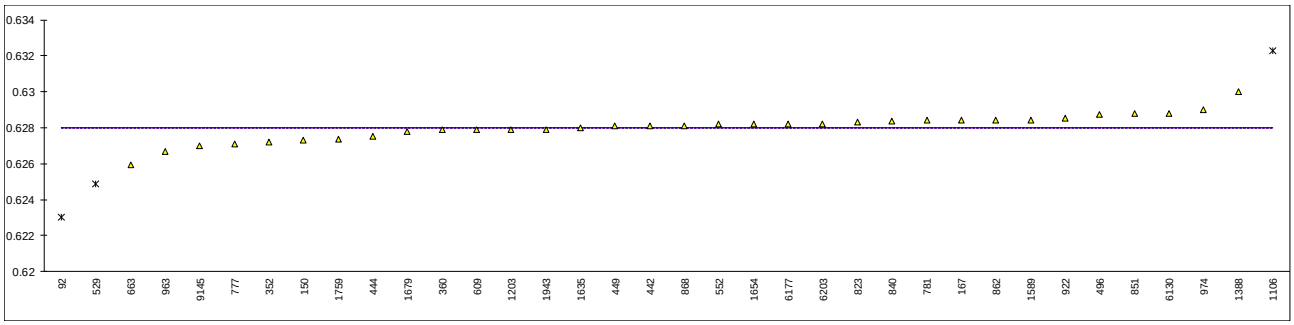
lab	method	value	mark	z(targ)	remarks
92	D2286	0.763	ex, E	-----	excluded, see paragraph 4.1, iis calc. 0.7650
130		-----		-----	
150	ISO6976	0.7687	C	-----	first reported:0.7663
151		-----		-----	
167	GPA2261	0.7679	E	-----	iis calc. 0.7698
225		-----		-----	
316		-----		-----	
352	ISO6976	0.7686	C	-----	first reported: 0.7662
360	ISO6976	0.7696		-----	
442	ISO6976	0.7697		-----	
444	ISO6976	0.7690		-----	
446		-----		-----	
449	ISO6976	0.7697		-----	
496	DIN51857	0.770454		-----	
525		-----		-----	
529	ISO6976	0.7658	ex	-----	excluded, see paragraph 4.1
552	ISO6976	0.7698		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609	ISO6976	0.7694		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	0.76712	C	-----	first reported: 0.76591
777	GOST31369	0.7684		-----	
781	GOST31369	0.7701		-----	
823	ISO6976	0.76996		-----	
840	ISO6976	0.77001		-----	
851	ISO6976	0.7705		-----	
862	ISO6976	0.7701		-----	
868	ISO6976	0.7697		-----	
887		-----		-----	
922	ISO6976	0.7702		-----	
963	ISO6976	0.7676		-----	
974	GPA2172	0.7707		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	0.7749	R(0.01)	-----	
1197		-----		-----	
1198		-----		-----	
1203	ISO6976	0.7695		-----	
1388	ISO6976	0.7720		-----	
1489		-----		-----	
1589		-----		-----	
1635	ISO6976	0.7696		-----	
1654	ISO6976	0.7698		-----	
1679	ISO6976	0.7693		-----	
1737		-----		-----	
1759	ISO6976	0.76877	C	-----	first reported: 0.7718
1788		-----		-----	
1943	ISO6976	0.7695		-----	
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	0.77053		-----	
6177	ISO6976	0.7698		-----	
6203	ISO6976	0.7699		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		0.768	E	-----	iis calc. 0.7701
	normality	OK			
	n	32			
	outliers	1 (+2ex)			
	mean (n)	0.76950			
	st.dev. (n)	0.000992			
	R(calc.)	0.00278			Compare R(iis18S01M) = 0.00329

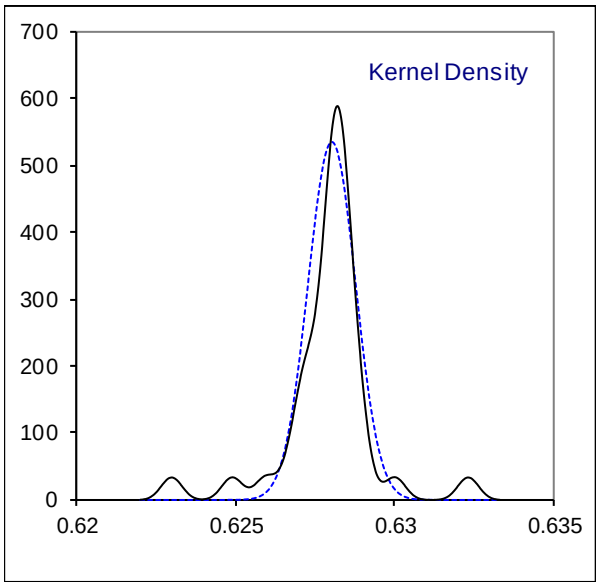

0.776
0.774
0.772
0.77
0.768
0.766
0.764
0.762
0.76
92
529
663
963
167
9145
777
352
150
1759
444
1679
609
1203
1943
360
1635
449
442
868
552
1654
6177
6203
823
840
781
862
922
496
851
6130
974
1388
1106


Kernel Density
450
400
350
300
250
200
150
100
50
0
0.76
0.765
0.77
0.775
0.78

Determination of Relative Density (Real Gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C) on sample #19060; results have no unit

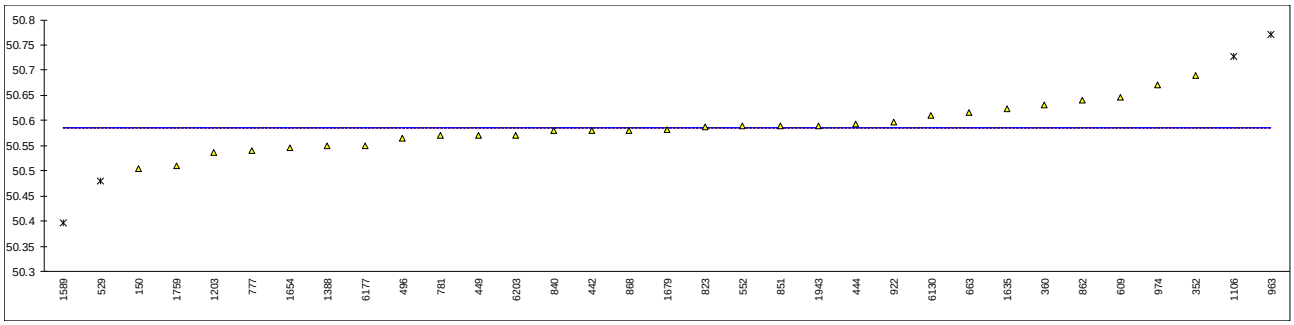
lab	method	value	mark	z(targ)	remarks
92	D2286	0.623	ex, E	-----	excluded, see paragraph 4.1, iis calc. 0.6243
130		-----		-----	
150	ISO6976	0.6273	C	-----	first reported: 0.6254
151		-----		-----	
167	GPA2261	0.6284		-----	
225		-----		-----	
316		-----		-----	
352	ISO6976	0.6272	C	-----	first reported: 0.6252
360	ISO6976	0.6279		-----	
442	ISO6976	0.6281		-----	
444	ISO6976	0.6275		-----	
446		-----		-----	
449	ISO6976	0.6281		-----	
496	DIN51857	0.628732		-----	
525		-----		-----	
529	ISO6976	0.6249	ex	-----	excluded, see paragraph 4.1
552	ISO6976	0.6282		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609	ISO6976	0.6279		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	0.62595	C	-----	first reported: 0.62497
777	GOST31369	0.6271		-----	
781	GOST31369	0.6284		-----	
823	ISO6976	0.62833		-----	
840	ISO6976	0.62838		-----	
851	ISO6976	0.6288		-----	
862	ISO6976	0.6284		-----	
868	ISO6976	0.6281		-----	
887		-----		-----	
922	ISO6976	0.6285		-----	
963	ISO6976	0.6267		-----	
974	GPA2172	0.6290		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	0.6323	R(0.01)	-----	
1197		-----		-----	
1198		-----		-----	
1203	ISO6976	0.6279		-----	
1388	ISO6976	0.6300		-----	
1489		-----		-----	
1589	D3588	0.6284		-----	
1635	ISO6976	0.6280		-----	
1654	ISO6976	0.6282		-----	
1679	ISO6976	0.6278		-----	
1737		-----		-----	
1759	ISO6976	0.62736	C	-----	first reported: 0.62986
1788		-----		-----	
1943	ISO6976	0.6279		-----	
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	0.62880		-----	
6177	ISO6976	0.6282		-----	
6203	ISO6976	0.6282		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		0.627	E	-----	iis calc. 0.6284
	normality	suspect			
	n	33			
	outliers	1 (+2ex)			
	mean (n)	0.62802			
	st.dev. (n)	0.000744			
	R(calc.)	0.00208			Compare R(iis18S01M) = 0.00262

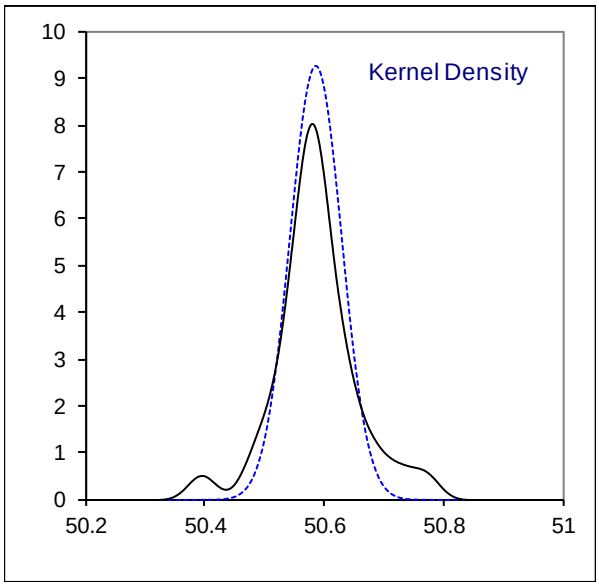

0.634
0.632
0.63
0.628
0.626
0.624
0.622
0.62
92
529
663
963
9145
777
352
150
1759
444
1679
360
609
1203
1943
1635
449
442
868
552
1654
6177
6203
823
840
781
167
862
1589
922
496
851
6130
974
1388
1106


Kernel Density
700
600
500
400
300
200
100
0
0.62
0.625
0.63
0.635

Determination of Wobbe Index (Real Gas, 101.325 kPa, combustion temperature 15°C, metering temperature 15°C) on sample #19060; results in MJ/m^3

lab	method	value	mark	z(targ)	remarks
92		-----		-----	
130		-----		-----	
150	ISO6976	50.504	C	-----	first reported: 50.432
151		-----		-----	
167		-----		-----	
225		-----		-----	
316		-----		-----	
352	ISO6976	50.69	C	-----	first reported: 50.85
360	ISO6976	50.63		-----	
442	ISO6976	50.58		-----	
444	ISO6976	50.594	E	-----	iis calc. 50.562
446		-----		-----	
449	ISO6976	50.57		-----	
496	DIN51857	50.5648		-----	
525		-----		-----	
529	ISO6976	50.48	ex	-----	excluded, see paragraph 4.1
552	ISO6976	50.59		-----	
574		-----		-----	
593		-----		-----	
600		-----		-----	
608		-----		-----	
609	ISO6976	50.6459		-----	
610		-----		-----	
611		-----		-----	
663	ISO6976	50.616	C	-----	first reported: 50.604
777	GOST31369	50.54		-----	
781	GOST31369	50.57		-----	
823	ISO6976	50.588		-----	
840	ISO6976	50.579		-----	
851	ISO6976	50.59		-----	
862	ISO6976	50.64		-----	
868	ISO6976	50.58		-----	
887		-----		-----	
922	ISO6976	50.5969		-----	
963	ISO6976	50.77	R(0.05)	-----	
974	GPA2172	50.67		-----	
1006		-----		-----	
1029		-----		-----	
1081		-----		-----	
1095		-----		-----	
1106	GPA2286	50.7272	ex, E	-----	excluded, see paragraph 4.1, iis calc. 50.753
1197		-----		-----	
1198		-----		-----	
1203	ISO6976	50.5371		-----	
1388	ISO6976	50.55		-----	
1489		-----		-----	
1589	D3588	50.3966	R(0.05), E	-----	iis calc. 50.493
1635	ISO6976	50.624		-----	
1654	ISO6976	50.545		-----	
1679	ISO6976	50.582		-----	
1737		-----		-----	
1759	ISO6976	50.5103	C	-----	first reported: 50.5997
1788		-----		-----	
1943	ISO6976	50.59		-----	
6062		-----		-----	
6104		-----		-----	
6105		-----		-----	
6130	GB/T11062	50.6099		-----	
6177	ISO6976	50.55		-----	
6203	ISO6976	50.57		-----	
6234		-----		-----	
6237		-----		-----	
6243		-----		-----	
9145		-----		-----	
	normality	OK			
	n	29			
	outliers	2 (+2ex)			
	mean (n)	50.5864			
	st.dev. (n)	0.04311			
	R(calc.)	0.1207			Compare R(iis18S01M) = 0.1706


50.8
50.75
50.7
50.65
50.6
50.55
50.5
50.45
50.4
50.35
50.3
1589
529
150
1759
1203
777
1654
1388
6177
496
781
449
6203
840
442
868
1679
823
552
851
1943
444
922
6130
663
1635
360
862
609
974
352
1106
963


Kernel Density
10
9
8
7
6
5
4
3
2
1
0
50.2
50.4
50.6
50.8
51

APPENDIX 2

Number of participants per country

1 lab in BRAZIL
1 lab in BRUNEI
1 lab in BULGARIA
2 labs in CANADA
9 labs in CHINA, People's Republic
1 lab in COLOMBIA
1 lab in COTE D'IVOIRE
1 lab in CROATIA
1 lab in ECUADOR
1 lab in FRANCE
2 labs in GERMANY
1 lab in HONG KONG
1 lab in HUNGARY
1 lab in ITALY
1 lab in LATVIA
9 labs in MALAYSIA
2 labs in MEXICO
2 labs in NETHERLANDS
2 labs in PAKISTAN
3 labs in PORTUGAL
1 lab in ROMANIA
2 labs in RUSSIAN FEDERATION
1 lab in SAUDI ARABIA
1 lab in SERBIA
1 lab in SLOVAKIA
1 lab in SOUTH KOREA
2 labs in TAIWAN
1 lab in THAILAND
1 lab in TURKEY
1 lab in UNITED ARAB EMIRATES
4 labs in UNITED KINGDOM
4 labs in UNITED STATES OF AMERICA
1 lab in VIETNAM

APPENDIX 3

Abbreviations:

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

Literature:

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics & Evaluation, June 2018
2 ISO 6974, Natural Gas – Determination of composition with defined uncertainty by GC
3 ASTM D1945, 2014 – Analysis of Natural Gas by Gaschromatography
4 W. Horwitz and R. Albert, J. AOAC Int., Vol. 79, 3, p. 589, (1996)
5 ASTM E178:02
6 ASTM E1301:03
7 ISO13528:05
8 ISO 5725:86
9 ISO 5725, parts 1-6, 1994
10 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
11 W.J. Youden and E.H. Steiner, Statistical Manual of the AOAC, (1975)
12 IP 367/84
13 DIN 38402 T41/42
14 P.L. Davies, Fr. Z. Anal. Chem, 331, 513, (1988)
15 J.N. Miller, Analyst, 118, 455, (1993)
16 Analytical Methods Committee Technical brief, No4 January 2001.
17 The Royal Society of Chemistry 2002, Analyst 2002, 127 page 1359-1364, P.J. Lowthian and M. Thompson.
18 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, *Technometrics*, 25(2), pp. 165-172, (1983)