Results of Proficiency Test
Dissolved Gas Analysis
November 2020

Organized by: Institute for Interlaboratory Studies
Spijkenisse, the Netherlands

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1 INTRODUCTION

Since 2007 the Institute for Interlaboratory Studies organizes a proficiency test on Dissolved Gas Analysis (DGA) in Transformer Oil every year. During the annual proficiency testing program 2020/2021, it was decided to continue the round robin on Dissolved Gas Analysis (DGA) in Transformer Oil.

In this interlaboratory study on DGA in Transformer Oil 66 laboratories from 36 different countries registered for participation. See appendix 3 for the number of participants per country. In this report the results of this interlaboratory study on Dissolved Gas Analysis (DGA) in Transformer Oil proficiency test are presented and discussed. This report is also electronically available through the iis website www.iisnl.com.

2 SET UP

The Institute for Interlaboratory Studies (iis) in Spijkenisse, the Netherlands, was the organizer of this proficiency test (PT). In total one batch of 72 certified syringes was prepared with lot code RN419. The syringes were prepared in a volume of 50 mL. The syringes (True North) were provided by Morgan Schaffer Ltd. (Quebec, Canada). Each syringe was uniquely numbered and labelled #20229. It was decided to send to each participating laboratory one syringe without the Morgan Schaffer certificate. Participants were requested to report rounded and unrounded test results. The unrounded test results were preferably used for statistical evaluation.

2.1 ACCREDITATION

The Institute for Interlaboratory Studies in Spijkenisse, the Netherlands, is accredited in agreement with ISO/IEC17043:2010 (R007), since January 2000, by the Dutch Accreditation Council (Raad voor Accreditatie). This PT falls under the accredited scope. This ensures strict adherence to protocols for sample preparation and statistical evaluation and 100% confidentiality of participant's data. Feedback from the participants on the reported data is encouraged and customer's satisfaction is measured on regular basis by sending out questionnaires.
Morgan Schaffer Ltd is ISO/IEC17025 and ISO/IEC17034 accredited by the ANSI National Accreditation Board (ANAB).

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 June 2018 (iis-protocol, version 3.5). This protocol can be downloaded from 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 type of Transformer Oil was used for the preparation of the gas tight syringes of 50 mL. These syringes were subsequently tested by Morgan Schaffer Ltd. (Quebec, Canada) in accordance with ASTM D3612.
In total one batch of 72 syringes was prepared with lot code RN419. Each syringe was labelled #20229. Morgan Schaffer Ltd. guaranteed that the batch to be homogenous according to their ISO/IEC17034 accreditation. The reported values are given in table 4 (see paragraph 5).
To each of the participating laboratories a syringe of 50 mL was sent on October 28, 2020. An SDS was added to the sample package.

2.5 STABILITY OF THE SAMPLES

Morgan Schaffer declares that bulk storage prior to shipping has a shelf life of at least 6 months. This was assumed to be sufficient for the period of the proficiency test.

2.6 ANALYZES

The participants were requested to determine on sample #20229: Hydrogen (H_2), Oxygen (O_2), Nitrogen (N_2), Carbon monoxide (CO), Carbon dioxide (CO_2), Methane (CH_4), Ethane (C_2H_6), Ethene (C_2H_4), Ethyne (C_2H_2), Propane (C_3H_8) and Propene (C_3H_6). Also, some analytical details were requested.

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 reference test methods (when applicable) 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 'Remarks' in the test result tables in appendix 1. Test results that came in after the deadline were not taken into account in this screening for suspect data and thus these participants were not requested for checks.

3.1 STATISTICS

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

According to ISO5725 the original test results per determination were submitted to Dixon's, Grubbs' 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 all 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 these 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. IEC reproducibilities, the z-scores were calculated using a target standard deviation. This results in an evaluation independent of the variation in this interlaboratory study.

The target standard deviation was calculated from the literature 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 according to:

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

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

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

	$\lvert z\rvert$	< 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 no major problems were encountered with the dispatch of samples. Two participants reported the test results after the final reporting date and seven participants did not report any test results at all. Not all participants were able to report all requested components.
Finally, 59 participants reported 561 numerical test results. Observed were 60 outlying test results, which is 10.7% 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

In this section the reported test results are discussed per component. The test methods which were used by the various laboratories were taken into account for explaining the observed differences when possible and applicable. These test methods are also in the tables together with the reported test results. The abbreviations, used in these tables, are explained in appendix 4.

Test values of laboratories 331, 657, 1460, 1505, 1719, 1890, 6071, 6085, 6088, 6278 and 6353 which were not indicated as outliers are excluded due to many other related statistical outliers of these laboratories.

Hydrogen (H_2): The determination of this component was problematic for a number of laboratories. Seven statistical outliers were observed and four other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of IEC60567:11.

Oxygen (O_2): The determination of this component was problematic for a number of laboratories. Four statistical outliers were observed and six other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of IEC60567:11.

Nitrogen (N_2): The determination of this component was problematic for a number of laboratories. Seven statistical outliers were observed and four other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of IEC60567:11.

Carbon monoxide (CO): The determination of this component was problematic for a number of laboratories. Nine 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 IEC60567:11.

Carbon dioxide (CO_2): The determination of this component was very problematic for a number of laboratories. Four statistical outliers were observed and nine other test results were excluded. The calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of IEC60567:11.

Methane (CH_4): The determination of this component was problematic for a number of laboratories. Seven statistical outliers were observed and four other test results were excluded. However, the calculated reproducibility after rejection of the suspect data is in full agreement with the requirements of IEC60567:11.

Ethane (C_2H_6): The determination of this component was problematic for a number of laboratories. Three statistical outliers were observed and eight other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of IEC60567:11.

Ethene (C_2H_4): The determination of this component was problematic for a number of laboratories. Six statistical outliers were observed and five other test results were excluded. The calculated reproducibility after rejection of the suspect data is not in agreement with the requirements of IEC60567:11.

Ethyne (C_2H_2): The determination of this component was problematic for a number of laboratories. Thirteen statistical outliers were observed and one test result was excluded. However, the calculated reproducibility after rejection of the suspect data is full in agreement with the requirements of IEC60567:11.

Propane (C_3H_8): The determination of this component was very problematic. No statistical outliers were observed but five test result were excluded. As the calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of IEC60567:11, it was decided not to calculate z-scores.

Propene (C_3H_6): The determination of this component was very problematic. No statistical outliers were observed but four test result were excluded. As the calculated reproducibility after rejection of the suspect data is not at all in agreement with the requirements of IEC60567:11, it was decided not to calculate z-scores.

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 test results, the average, the calculated reproducibility (2.8 * standard deviation) and the target reproducibility derived from the reference test method (in casu IEC60567 test method) are compared in next table.

Component	unit	n	average	2.8 * sd	R(lit)
Hydrogen (H_2)	µL/L	48	99.4	24.8	19.9
Oxygen (O_2)	µL/L	47	15658	5592	3132
Nitrogen (N_2)	µL/L	45	55981	13073	11196
Carbon monoxide (CO)	µL/L	47	98.9	23.4	19.8
Carbon dioxide (CO_2)	µL/L	44	130.8	69.9	26.2
Methane (CH_4)	µL/L	48	98.7	20.8	19.7
Ethane (C_2H_6)	µL/L	48	101.2	25.9	20.2
Ethene (C_2H_4)	µL/L	48	100.5	24.2	20.1
Ethyne (C_2H_2)	µL/L	45	100.8	21.6	20.2
Propane (C_3H_8)	µL/L	15	99.4	65.7	(19.9)
Propene (C_3H_6)	µL/L	13	102.0	69.5	(20.4)

Table 1: reproducibilities of components on sample #20229

Without further statistical calculations it can be concluded from the overview given in table 1 that for most determinations it is difficult to get a compliance of the performance of the group of participating laboratories with the relevant standard IEC60567:11.

The problematic components have been discussed in paragraph 4.1.

4.3 COMPARISON OF THE PROFICIENCY TEST OF NOVEMBER 2020 WITH PREVIOUS PTS

	November 2020	November 2019	November 2018	November 2017	November 2016
Number of reporting laboratories	59	45	53	61	53
Number of test results	561	428	496	580	487
Number of statistical outliers	60	44	25	21	57
Percentage of statistical outliers	10.7%	10.3%	5.0%	3.6%	11.7%

Table 2: 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, expressed as relative standard deviation (RSD) of the PTs, see below table.

Component	November 2020	November 2019	November 2018	November 2017	November 2016	IEC605671
Hydrogen (H_2)	9%	13%	10%	15%	10%	7%
Oxygen (O_2)	13%	13%	8%	12%	13%	7%
Nitrogen (N_2)	8%	11%	12%	19%	13%	7%
Carbon Monoxide (CO)	8%	11%	10%	16%	12%	7%
Carbon Dioxide CO_2)	19%	18%	9%	15%	16%	7%
Methane (CH_4)	8%	8%	8%	12%	10%	7%
Ethane (C_2H_6)	9%	12%	9%	11%	12%	7%

Component	November 2020	November 2019	November 2018	November 2017	November 2016	IEC605671
Ethene (C_2H_4)	9%	9%	8%	12%	12%	7%
Ethyne (C_2H_2)	8%	12%	9%	11%	12%	7%
Propane (C_3H_8)	n.e.	n.e.	n.e.	11%	9%	n.e.
Propene (C_3H_6)	n.e.	11%	12%	n.e.	n.e.	n.e.

Table 3: comparison of the uncertainties on the various components

The overall performance of the 2020 PT is in line with previous PTs. It is remarkable that the experienced groups of participants have been consistent in RSD over the last five years, but still are not able to meet the strict target value of IEC605671.

5. DISCUSSION

The consensus values as determined in this PT are compared with the average values from the homogeneity testing by Morgan Schaffer in the following table. From this comparison, it is clear that all consensus values as determined in this PT are very well in line with the values as determined by Morgan Schaffer after the preparation of the syringes.

Component	Morgan Schaffer in µL/L	iis20L13 in µL/L	Differences in µL/L	Calculated z-scores
Hydrogen (H_2)	101	99	2	0.23
Oxygen (O_2)	15700	15658	42	0.04
Nitrogen (N_2)	55900	55981	-81	-0.02
Carbon monoxide (CO)	100	99	1	0.16
Carbon dioxide (CO_2)	130	131	-1	-0.09
Methane (CH_4)	100	99	1	0.18
Ethane (C_2H_6)	101	101	0	-0.03
Ethene (C_2H_4)	100	101	-1	-0.07
Ethyne (C_2H_2)	101	101	0	0.03
Propane (C_3H_8)	102	99	3	n.e.
Propene (C_3H_6)	100	102	-2	n.e.

Table 4: comparison of consensus values with values determined by Morgan Schaffer

Regarding the extraction method used a vast majority (75%) of the participants that reported analytical details used “Head Space”.

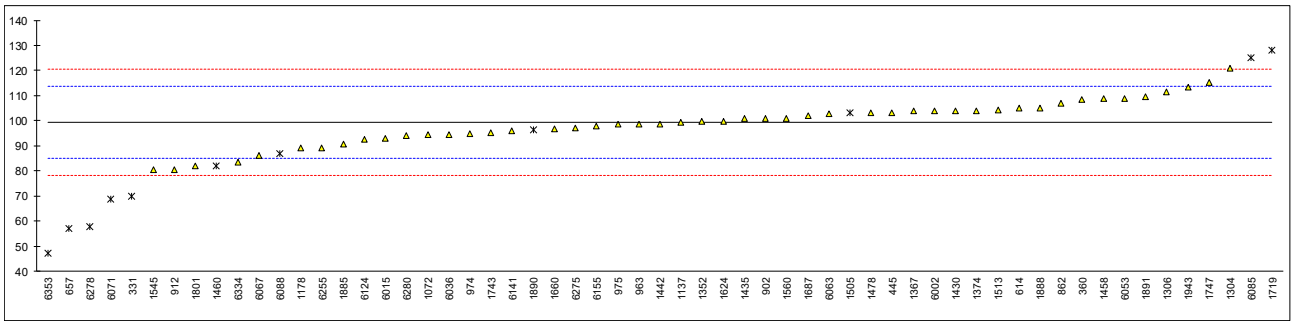
Although it can be concluded that most of the participants have no problem with the determination on Dissolved Gas Analysis (DGA) in this PT, each participating laboratory will have to evaluate its performance in this study and decide about any corrective actions if necessary. Therefore, participation on a regular basis in this scheme could be helpful to improve the performance and thus increase the quality of the analytical results.

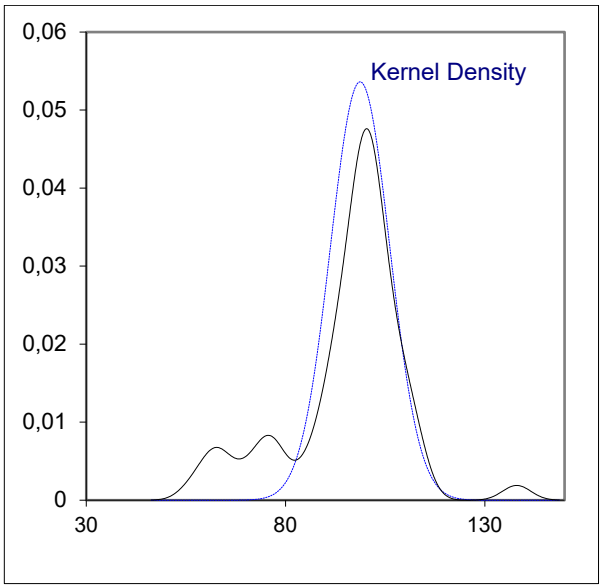
APPENDIX 1

Determination of Hydrogen (H_2) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	70	R(0.05)	-4.14	
360	IEC60567	108.5		1.28	
445	IEC60567	103.34		0.56	
511		-----		-----	
614	IEC60567	105		0.79	
657	D3612	57.2	R(0.05)	-5.94	
862	IEC60567	107		1.07	
902	D3612	101		0.23	
912	IEC60567	80.52	C	-2.66	first reported: 47
913		-----		-----	
963	D3612	98.5		-0.13	
974	D3612	95		-0.62	
975	D3612	98.5		-0.13	
1072	IEC60567	94.4		-0.70	
1135		-----		-----	
1137	D3612	99.22379		-0.02	
1178	IEC60567	89.20		-1.44	
1264		-----		-----	
1304	IEC60567	120.9		3.03	
1306	In house	111.36253		1.69	
1352	IEC60567	99.8		0.06	
1367	IEC60567	103.79		0.62	
1374	D3612	104		0.65	
1430	IEC60567	104		0.65	
1435	IEC60567	101		0.23	
1442	IEC60567	98.7		-0.10	
1444		-----		-----	
1458	D3612	109		1.35	
1460	D3612	82.02	ex	-2.45	test result excluded, see paragraph 4.1
1478	IEC60567	103.05		0.51	
1505	D3612	103	ex	0.51	test result excluded, see paragraph 4.1
1513	IEC60567	104.41		0.71	
1545	D3612	80.4	C	-2.68	first reported: 147.5
1560	IEC60567	101		0.23	
1624	IEC60567	99.95		0.08	
1660	IEC60567	96.7		-0.38	
1687	IEC60567	102.1		0.38	
1719	D3612	128	R(0.05)	4.03	
1743	IEC60567	95.1		-0.61	
1747	IEC60567	115.32		2.24	
1801	IEC60567	82		-2.45	
1885	D3612	90.8		-1.21	
1888		105.0		0.79	
1890	D3612	96.30	ex	-0.44	test result excluded, see paragraph 4.1
1891	IEC60567	109.6		1.44	
1943	D3612	113.50982		1.99	
6002	IEC60567	103.9		0.63	
6015	D3612	93.00		-0.90	
6036	IEC60567	94.4		-0.70	
6053	IEC60567	109		1.35	
6063	IEC60567	102.72		0.47	
6067	IEC60567	86		-1.89	
6071	IEC60567	68.91	R(0.05)	-4.29	
6085	D3612	125	R(0.05)	3.61	
6088	IEC60567	87	ex	-1.75	test result excluded, see paragraph 4.1
6124		92.5		-0.97	
6141	D3612	95.936		-0.49	
6155	IEC60567	98.047705		-0.19	
6255	IEC60567	89.2		-1.44	
6275	IEC60567	97		-0.34	
6278	D3612	58	R(0.05)	-5.83	
6280	D3612	94.2		-0.73	
6334	IEC60567	83.46	C	-2.24	first reported: 161
6353	IEC60567	47.4	R(0.05)	-7.32	

normality	OK
n	48
outliers	7 (+4ex)
mean (n)	99.40
st.dev. (n)	8.849
R(calc.)	24.78
st.dev.(IEC60567:11)	7.100
R(IEC60567:11)	19.879

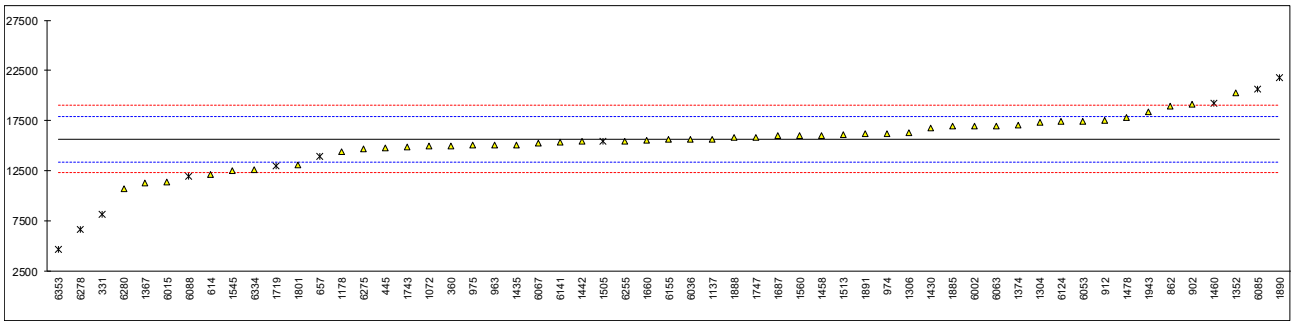


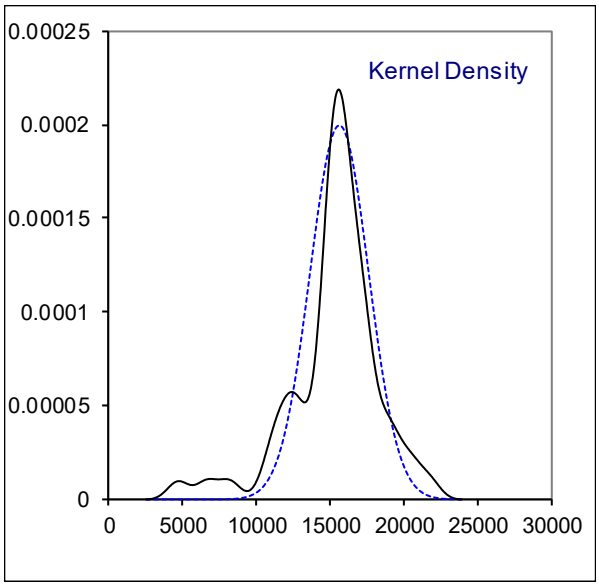


Determination of Oxygen (O_2) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	8193	R(0.05)	-6.67	
360	IEC60567	14993.0		-0.59	
445	IEC60567	14815.20		-0.75	
511		-----		-----	
614	IEC60567	12196		-3.10	
657	D3612	13993	ex	-1.49	test result excluded, see paragraph 4.1
862	IEC60567	18961		2.95	
902	D3612	19165		3.14	
912	IEC60567	17530	C	1.67	first reported: 8455
913		-----		-----	
963	D3612	15085.6		-0.51	
974	D3612	16204		0.49	
975	D3612	15071		-0.52	
1072	IEC60567	14963.4		-0.62	
1135		-----		-----	
1137	D3612	15684.3		0.02	
1178	IEC60567	14424.22		-1.10	
1264		-----		-----	
1304	IEC60567	17331.0		1.50	
1306	In house	16324.8		0.60	
1352	IEC60567	20271		4.12	
1367	IEC60567	11323.54		-3.88	
1374	D3612	17100		1.29	
1430	IEC60567	16787		1.01	
1435	IEC60567	15100		-0.50	
1442	IEC60567	15411		-0.22	
1444		-----		-----	
1458	D3612	16034		0.34	
1460	D3612	19278	ex	3.24	test result excluded, see paragraph 4.1
1478	IEC60567	17834.04		1.95	
1505	D3612	15433	ex	-0.20	test result excluded, see paragraph 4.1
1513	IEC60567	16160		0.45	
1545	D3612	12573.7		-2.76	
1560	IEC60567	16024		0.33	
1624		-----		-----	
1660	IEC60567	15554		-0.09	
1687	IEC60567	16020.8		0.32	
1719	D3612	13041	ex	-2.34	test result excluded, see paragraph 4.1
1743	IEC60567	14900		-0.68	
1747	IEC60567	15865.56		0.19	
1801	IEC60567	13127		-2.26	
1885	D3612	16931.3		1.14	
1888		15851.2		0.17	
1890	D3612	21821	R(0.05)	5.51	
1891	IEC60567	16183		0.47	
1943	D3612	18421.7		2.47	
6002	IEC60567	16970		1.17	
6015	D3612	11438.0		-3.77	
6036	IEC60567	15662		0.00	
6053	IEC60567	17414		1.57	
6063	IEC60567	17003.75		1.20	
6067	IEC60567	15296		-0.32	
6071		-----		-----	
6085	D3612	20679	ex	4.49	test result excluded, see paragraph 4.1
6088	IEC60567	11962	ex,C	-3.30	test result excluded, see paragraph 4.1, first reported: 9726
6124		17409.7		1.57	
6141	D3612	15349.3		-0.28	
6155	IEC60567	15660.05		0.00	
6255	IEC60567	15439.1		-0.20	
6275	IEC60567	14695.5		-0.86	
6278	D3612	6636	R(0.05)	-8.07	
6280	D3612	10755		-4.38	
6334	IEC60567	12597		-2.74	
6353	IEC60567	4678	C,R(0.05)	-9.82	first reported: 5680.3

normality	OK
n	47
outliers	4 (+6ex)
mean (n)	15657.68
st.dev. (n)	1997.174
R(calc.)	5592.09
st.dev.(IEC60567:11)	1118.405
R(IEC60567:11)	3131.54

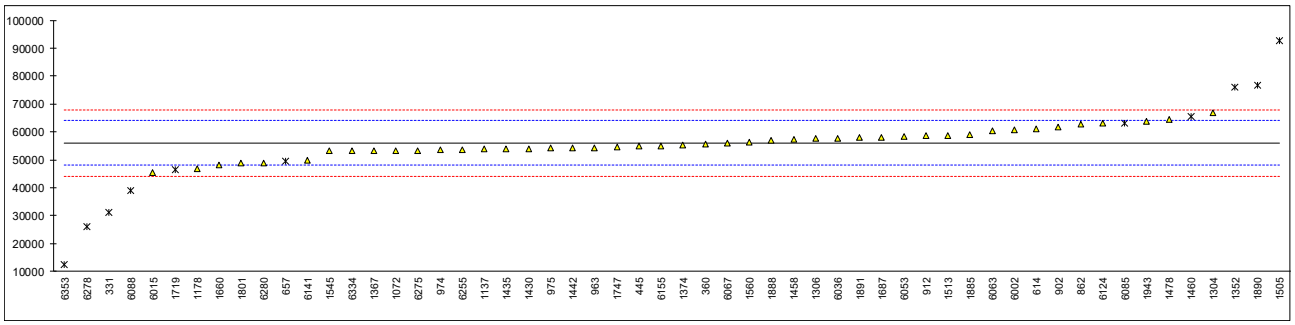


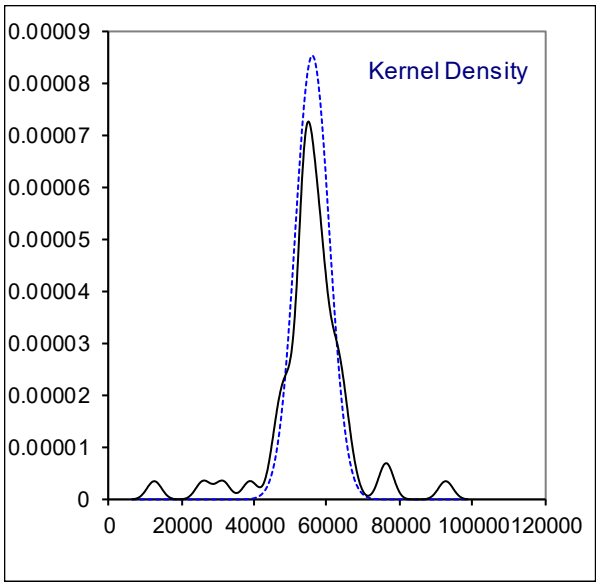


Determination of Nitrogen (N_2) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	31265	R(0.05)	-6.18	
360	IEC60567	55647.6		-0.08	
445	IEC60567	54956.26		-0.26	
511		-----		-----	
614	IEC60567	61095		1.28	
657	D3612	49625	ex	-1.59	test result excluded, see paragraph 4.1
862	IEC60567	62937		1.74	
902	D3612	61750		1.44	
912	IEC60567	58555	C	0.64	first reported: 29851
913		-----		-----	
963	D3612	54370.7		-0.40	
974	D3612	53584		-0.60	
975	D3612	54222		-0.44	
1072	IEC60567	53277.5		-0.68	
1135		-----		-----	
1137	D3612	53779.9		-0.55	
1178	IEC60567	46775.26		-2.30	
1264		-----		-----	
1304	IEC60567	66872.8		2.72	
1306	In house	57519.4		0.38	
1352	IEC60567	76109	R(0.05)	5.03	
1367	IEC60567	53259.69		-0.68	
1374	D3612	55300		-0.17	
1430	IEC60567	54047		-0.48	
1435	IEC60567	54000		-0.50	
1442	IEC60567	54350		-0.41	
1444		-----		-----	
1458	D3612	57351		0.34	
1460	D3612	65328	ex	2.34	test result excluded, see paragraph 4.1
1478	IEC60567	64400.95		2.11	
1505	D3612	92727	R(0.01)	9.19	
1513	IEC60567	58624		0.66	
1545	D3612	53082.4		-0.72	
1560	IEC60567	56451		0.12	
1624		-----		-----	
1660	IEC60567	48223		-1.94	
1687	IEC60567	58069.4		0.52	
1719	D3612	46281	ex	-2.43	test result excluded, see paragraph 4.1
1743	IEC60567	>54100		-----	
1747	IEC60567	54633.15		-0.34	
1801	IEC60567	48677		-1.83	
1885	D3612	58913.6		0.73	
1888		56956.4		0.24	
1890	D3612	76557	R(0.05)	5.15	
1891	IEC60567	58026		0.51	
1943	D3612	63696.9		1.93	
6002	IEC60567	60687		1.18	
6015	D3612	45528.5		-2.61	
6036	IEC60567	57661		0.42	
6053	IEC60567	58360		0.60	
6063	IEC60567	60229.81		1.06	
6067	IEC60567	56076		0.02	
6071		-----		-----	
6085	D3612	63187	ex	1.80	test result excluded, see paragraph 4.1
6088	IEC60567	38836	C,R(0.05)	-4.29	first reported: 31510
6124		63042.7		1.77	
6141	D3612	49960.74		-1.51	
6155	IEC60567	55063.6		-0.23	
6255	IEC60567	53676.5		-0.58	
6275	IEC60567	53387.5		-0.65	
6278	D3612	25954	R(0.05)	-7.51	
6280	D3612	48948		-1.76	
6334	IEC60567	53098		-0.72	
6353	IEC60567	12458	C,R(0.01)	-10.88	first reported: 20305.5

normality	OK
n	45
outliers	7 (+4ex)
mean (n)	55980.52
st.dev. (n)	4669.054
R(calc.)	13073.35
st.dev.(IEC60567:11)	3998.609
R(IEC60567:11)	11196.10

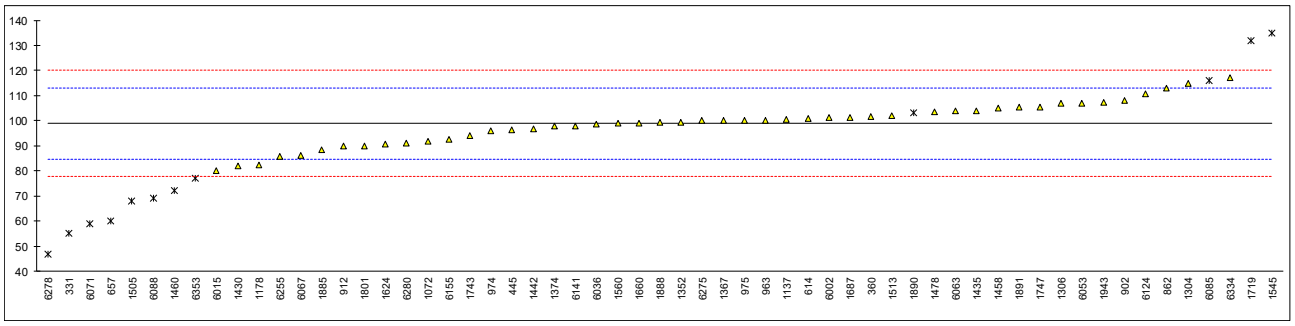


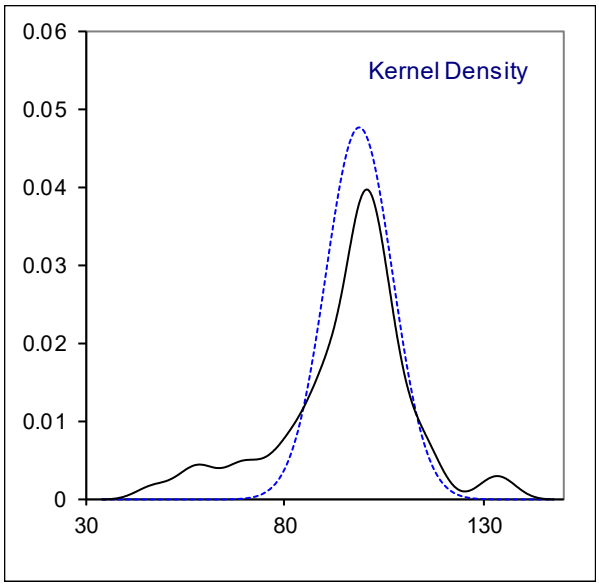


Determination of Carbon monoxide (CO) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	55	R(0.05)	-6.21	
360	IEC60567	101.6		0.39	
445	IEC60567	96.30		-0.36	
511		-----		-----	
614	IEC60567	101		0.30	
657	D3612	60.1	R(0.05)	-5.49	
862	IEC60567	113		2.00	
902	D3612	108		1.30	
912	IEC60567	89.78	C	-1.28	first reported: 47
913		-----		-----	
963	D3612	100.2		0.19	
974	D3612	96		-0.40	
975	D3612	100.2		0.19	
1072	IEC60567	91.9		-0.98	
1135		-----		-----	
1137	D3612	100.33237		0.21	
1178	IEC60567	82.46		-2.32	
1264		-----		-----	
1304	IEC60567	114.7		2.25	
1306	In house	106.89244		1.14	
1352	IEC60567	99.5		0.09	
1367	IEC60567	100.195		0.19	
1374	D3612	98		-0.12	
1430	IEC60567	82		-2.39	
1435	IEC60567	104		0.73	
1442	IEC60567	96.9		-0.28	
1444		-----		-----	
1458	D3612	105		0.87	
1460	D3612	72.37	R(0.05)	-3.75	
1478	IEC60567	103.51		0.66	
1505	D3612	67.9	R(0.05)	-4.38	
1513	IEC60567	102.19		0.47	
1545	D3612	135.0	R(0.05)	5.12	
1560	IEC60567	99		0.02	
1624	IEC60567	90.81		-1.14	
1660	IEC60567	99.0		0.02	
1687	IEC60567	101.2		0.33	
1719	D3612	132	R(0.05)	4.70	
1743	IEC60567	94		-0.69	
1747	IEC60567	105.59		0.95	
1801	IEC60567	90		-1.25	
1885	D3612	88.4		-1.48	
1888		99.4		0.08	
1890	D3612	103.3	ex	0.63	test result excluded, see paragraph 4.1
1891	IEC60567	105.4		0.93	
1943	D3612	107.20403		1.18	
6002	IEC60567	101.1		0.32	
6015	D3612	80.00		-2.67	
6036	IEC60567	98.8		-0.01	
6053	IEC60567	107		1.15	
6063	IEC60567	103.82		0.70	
6067	IEC60567	86		-1.82	
6071	IEC60567	58.78	R(0.05)	-5.67	
6085	D3612	116	ex	2.43	test result excluded, see paragraph 4.1
6088	IEC60567	69	C,R(0.05)	-4.23	first reported: 57
6124		110.9		1.71	
6141	D3612	98.007		-0.12	
6155	IEC60567	92.63948		-0.88	
6255	IEC60567	85.9		-1.83	
6275	IEC60567	100		0.16	
6278	D3612	47	R(0.05)	-7.34	
6280	D3612	91		-1.11	
6334	IEC60567	117		2.57	
6353	IEC60567	77.1	ex	-3.08	test result excluded, see paragraph 4.1

normality	OK
n	47
outliers	9 (+3ex)
mean (n)	98.85
st.dev. (n)	8.367
R(calc.)	23.43
st.dev.(IEC60567:11)	7.061
R(IEC60567:11)	19.77

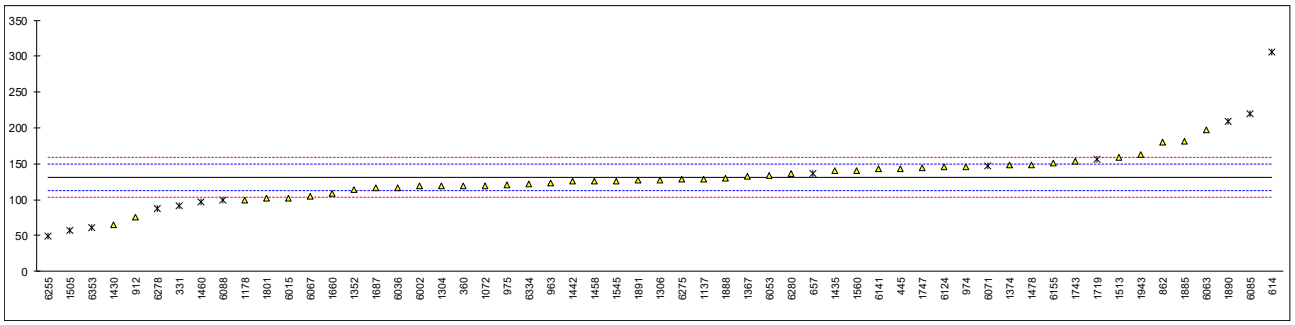


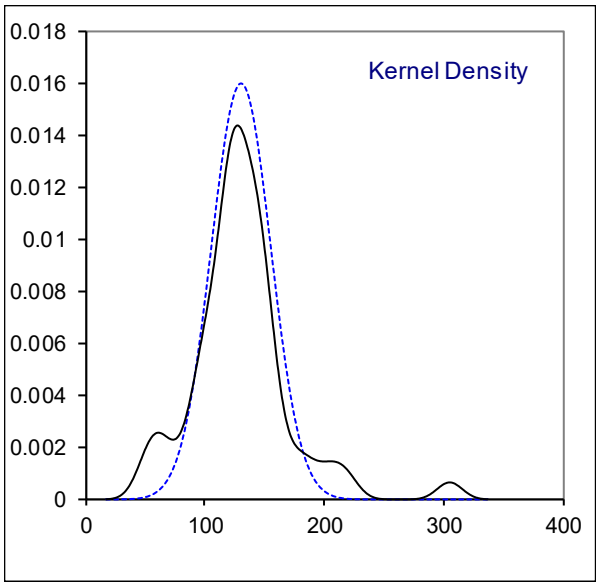


Determination of Carbon dioxide (CO_2) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	92	ex	-4.16	test result excluded, see paragraph 4.1
360	IEC60567	119.8		-1.18	
445	IEC60567	143.59		1.37	
511		-----		-----	
614	IEC60567	306	R(0.01)	18.74	
657	D3612	137.0	ex	0.66	test result excluded, see paragraph 4.1
862	IEC60567	180		5.26	
902		-----		-----	
912	IEC60567	75		-5.97	
913		-----		-----	
963	D3612	122.6		-0.88	
974	D3612	146		1.62	
975	D3612	120.1		-1.15	
1072	IEC60567	119.9		-1.17	
1135		-----		-----	
1137	D3612	128.89415		-0.21	
1178	IEC60567	100.09		-3.29	
1264		-----		-----	
1304	IEC60567	119.7		-1.19	
1306	In house	127.34384		-0.37	
1352	IEC60567	114		-1.80	
1367	IEC60567	132.075		0.13	
1374	D3612	148		1.84	
1430	IEC60567	65		-7.04	
1435	IEC60567	140		0.98	
1442	IEC60567	125.7		-0.55	
1444		-----		-----	
1458	D3612	126		-0.52	
1460	D3612	96.37	ex	-3.69	test result excluded, see paragraph 4.1
1478	IEC60567	148.99		1.94	
1505	D3612	56.7	ex	-7.93	test result excluded, see paragraph 4.1
1513	IEC60567	159		3.01	
1545	D3612	126.2		-0.50	
1560	IEC60567	140		0.98	
1624	IEC60567	<50		<-8.65	possibly a false negative test result?
1660	IEC60567	108.1		-2.43	
1687	IEC60567	116.6		-1.52	
1719	D3612	156	ex	2.69	test result excluded, see paragraph 4.1
1743	IEC60567	154		2.48	
1747	IEC60567	144.56		1.47	
1801	IEC60567	102		-3.09	
1885	D3612	181.9		5.46	
1888		130.0		-0.09	
1890	D3612	209.6	R(0.05)	8.43	
1891	IEC60567	126.9		-0.42	
1943	D3612	163.54121		3.50	
6002	IEC60567	119.3		-1.23	
6015	D3612	102.50		-3.03	
6036	IEC60567	117.2		-1.46	
6053	IEC60567	134		0.34	
6063	IEC60567	197.76		7.16	
6067	IEC60567	105		-2.76	
6071	IEC60567	147.36	ex	1.77	test result excluded, see paragraph 4.1
6085	D3612	220	R(0.05)	9.54	
6088	IEC60567	99	ex	-3.41	test result excluded, see paragraph 4.1
6124		145.6		1.58	
6141	D3612	143.024		1.30	
6155	IEC60567	150.450985		2.10	
6255	IEC60567	49.6	R(0.05)	-8.69	
6275	IEC60567	128		-0.30	
6278	D3612	87	ex	-4.69	test result excluded, see paragraph 4.1
6280	D3612	136		0.55	
6334	IEC60567	122.22	C	-0.92	first reported: 23
6353	IEC60567	60.5	ex	-7.53	test result excluded, see paragraph 4.1

normality	suspect
n	44
outliers	4 (+9ex)
mean (n)	130.83
st.dev. (n)	24.975
R(calc.)	69.93
st.dev.(IEC60567:11)	9.345
R(IEC60567:11)	26.17

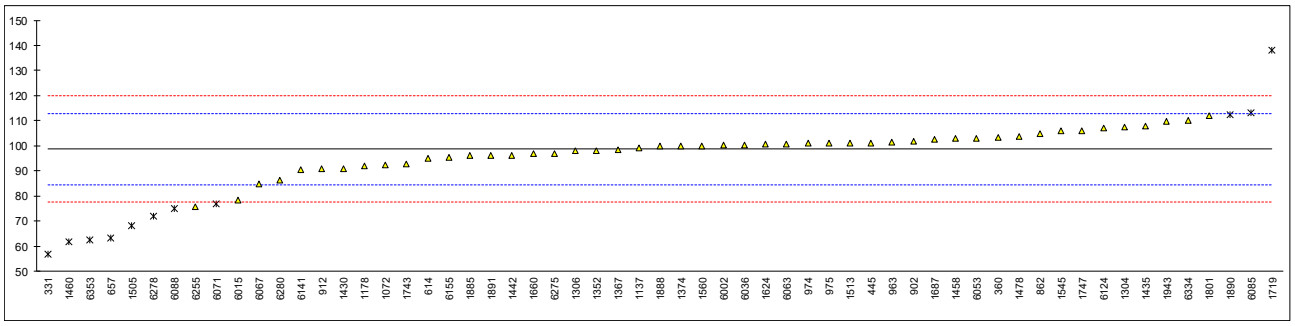


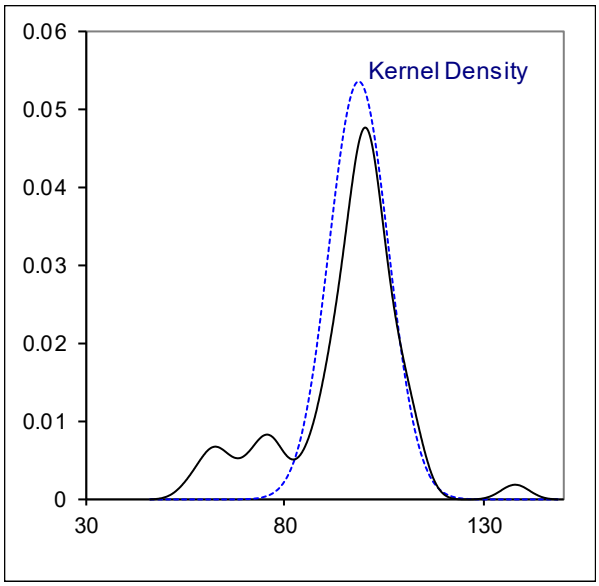


Determination of Methane (CH_4) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	57	R(0.05)	-5.92	
360	IEC60567	103.4		0.67	
445	IEC60567	101.13		0.34	
511		-----		-----	
614	IEC60567	95		-0.53	
657	D3612	63.4	R(0.05)	-5.01	
862	IEC60567	105		0.89	
902	D3612	102		0.47	
912	IEC60567	90.92	C	-1.10	first reported: 54
913		-----		-----	
963	D3612	101.4		0.38	
974	D3612	101		0.33	
975	D3612	101.0		0.33	
1072	IEC60567	92.5		-0.88	
1135		-----		-----	
1137	D3612	99.04865		0.05	
1178	IEC60567	92.15		-0.93	
1264		-----		-----	
1304	IEC60567	107.5		1.25	
1306	In house	98.07247		-0.09	
1352	IEC60567	98.2		-0.07	
1367	IEC60567	98.29		-0.06	
1374	D3612	100		0.18	
1430	IEC60567	91		-1.09	
1435	IEC60567	108		1.32	
1442	IEC60567	96.2		-0.35	
1444		-----		-----	
1458	D3612	103		0.61	
1460	D3612	61.85	R(0.05)	-5.23	
1478	IEC60567	103.61		0.70	
1505	D3612	68.2	R(0.05)	-4.33	
1513	IEC60567	101.12		0.34	
1545	D3612	105.9		1.02	
1560	IEC60567	100		0.18	
1624	IEC60567	100.52		0.26	
1660	IEC60567	96.8		-0.27	
1687	IEC60567	102.6		0.55	
1719	D3612	138	R(0.05)	5.57	
1743	IEC60567	92.6		-0.87	
1747	IEC60567	106.01		1.04	
1801	IEC60567	112		1.89	
1885	D3612	96.0		-0.38	
1888		99.8		0.16	
1890	D3612	112.40	ex	1.94	
1891	IEC60567	96.0		-0.38	
1943	D3612	109.90087		1.59	
6002	IEC60567	100.5		0.26	
6015	D3612	78.50		-2.87	
6036	IEC60567	100.5		0.26	
6053	IEC60567	103		0.61	
6063	IEC60567	100.52		0.26	
6067	IEC60567	85		-1.94	
6071	IEC60567	77.06	ex	-3.07	test result excluded, see paragraph 4.1
6085	D3612	113	ex	2.03	test result excluded, see paragraph 4.1
6088	IEC60567	75	ex,C	-3.36	test result excluded, see paragraph 4.1, first reported: 64
6124		107.0		1.18	
6141	D3612	90.489		-1.16	
6155	IEC60567	95.423135		-0.47	
6255	IEC60567	75.6	C	-3.28	first reported: 57.2
6275	IEC60567	97		-0.24	
6278	D3612	72	R(0.05)	-3.79	
6280	D3612	86.5		-1.73	
6334	IEC60567	110		1.60	
6353	IEC60567	62.4	C,R(0.05)	-5.15	first reported: 49.6

normality	suspect
n	48
outliers	7 (+4ex)
mean (n)	98.70
st.dev. (n)	7.439
R(calc.)	20.83
st.dev.(IEC60567:11)	7.050
R(IEC60567:11)	19.74

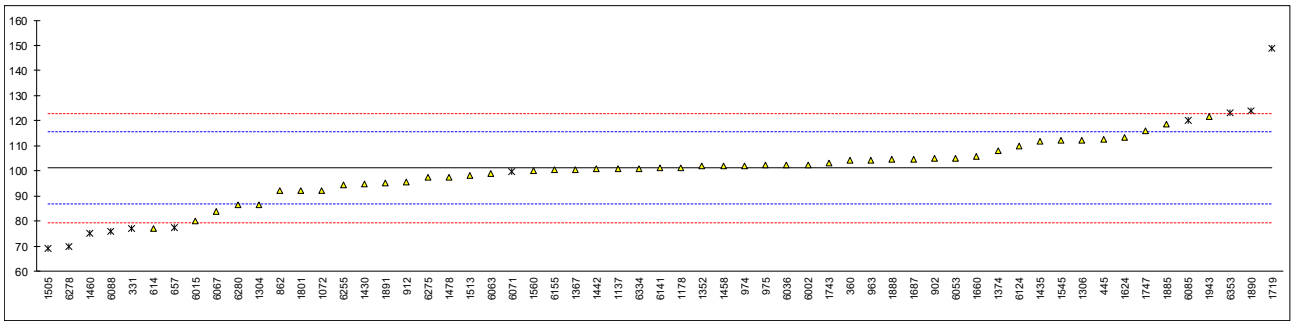


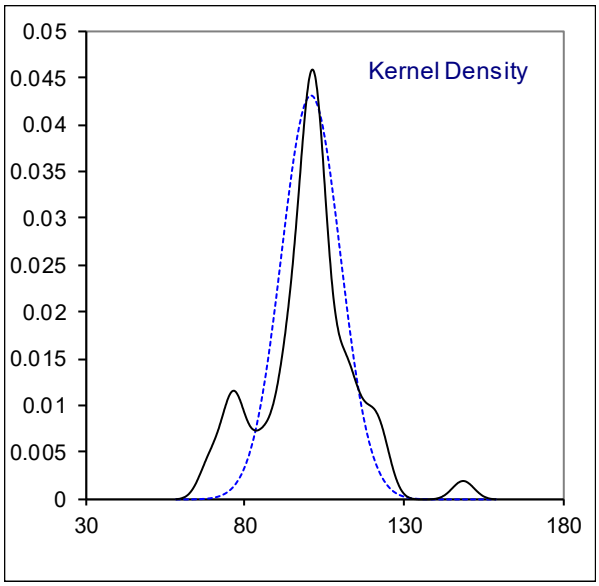


Determination of Ethane (C_2H_6) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	77	ex	-3.35	test result excluded, see paragraph 4.1
360	IEC60567	104.4		0.44	
445	IEC60567	112.74		1.60	
511		-----		-----	
614	IEC60567	77		-3.35	
657	D3612	77.3	ex	-3.31	test result excluded, see paragraph 4.1
862	IEC60567	92		-1.27	
902	D3612	105		0.53	
912	IEC60567	95.67	C	-0.76	first reported: 58
913		-----		-----	
963	D3612	104.4		0.44	
974	D3612	102		0.11	
975	D3612	102.4		0.17	
1072	IEC60567	92.2		-1.24	
1135		-----		-----	
1137	D3612	100.92239		-0.04	
1178	IEC60567	101.41		0.03	
1264		-----		-----	
1304	IEC60567	86.7		-2.00	
1306	In house	112.35612		1.54	
1352	IEC60567	102		0.11	
1367	IEC60567	100.655		-0.07	
1374	D3612	108		0.94	
1430	IEC60567	95		-0.86	
1435	IEC60567	112		1.50	
1442	IEC60567	100.9		-0.04	
1444		-----		-----	
1458	D3612	102		0.11	
1460	D3612	75.30	ex	-3.58	test result excluded, see paragraph 4.1
1478	IEC60567	97.66		-0.49	
1505	D3612	69.1	R(0.05)	-4.44	
1513	IEC60567	98.37		-0.39	
1545	D3612	112.2		1.52	
1560	IEC60567	100		-0.16	
1624	IEC60567	113.45		1.70	
1660	IEC60567	105.8		0.64	
1687	IEC60567	104.8		0.50	
1719	D3612	149	R(0.01)	6.61	
1743	IEC60567	103		0.25	
1747	IEC60567	116.17		2.07	
1801	IEC60567	92		-1.27	
1885	D3612	118.7		2.42	
1888		104.5		0.46	
1890	D3612	123.90	ex	3.14	test result excluded, see paragraph 4.1
1891	IEC60567	95.2		-0.83	
1943	D3612	121.70455		2.84	
6002	IEC60567	102.5		0.18	
6015	D3612	80.00		-2.93	
6036	IEC60567	102.4		0.17	
6053	IEC60567	105		0.53	
6063	IEC60567	98.88		-0.32	
6067	IEC60567	84		-2.38	
6071	IEC60567	99.73	ex	-0.20	test result excluded, see paragraph 4.1
6085	D3612	120	ex	2.60	test result excluded, see paragraph 4.1
6088	IEC60567	76	ex	-3.49	test result excluded, see paragraph 4.1
6124		110.1		1.23	
6141	D3612	101.172		0.00	
6155	IEC60567	100.640145		-0.08	
6255	IEC60567	94.3		-0.95	
6275	IEC60567	97.5		-0.51	
6278	D3612	70	R(0.05)	-4.32	
6280	D3612	86.4		-2.05	
6334	IEC60567	101		-0.03	
6353	IEC60567	123	ex,C	3.02	test result excluded, see paragraph 4.1, first reported: 51.6

normality	OK
n	48
outliers	3 (+8ex)
mean (n)	101.19
st.dev. (n)	9.261
R(calc.)	25.93
st.dev.(IEC60567:11)	7.228
R(IEC60567:11)	20.24

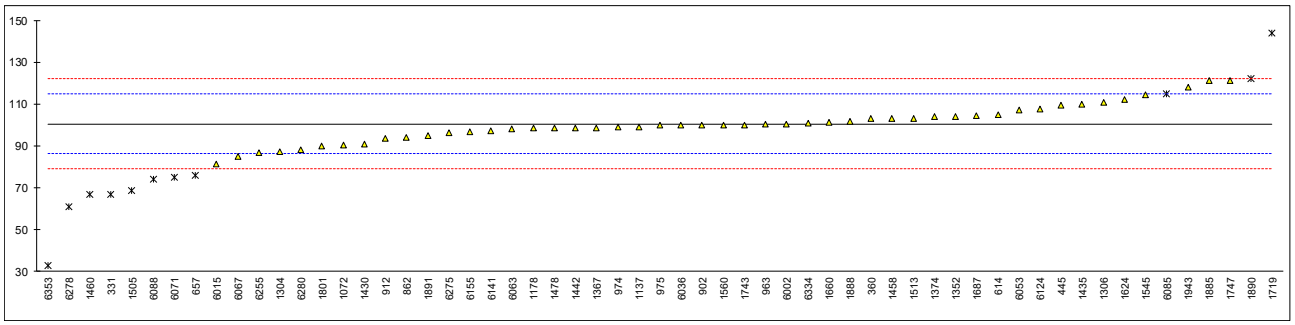


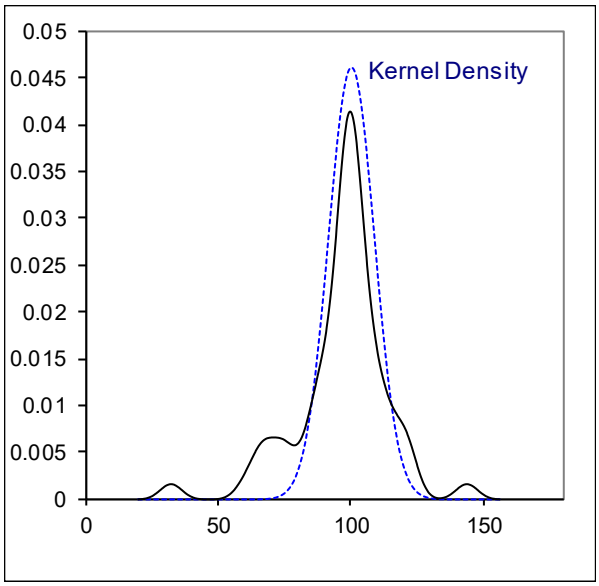


Determination of Ethene (C_2H_4) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	67	R(0.05)	-4.67	
360	IEC60567	103.0		0.34	
445	IEC60567	109.38		1.23	
511		-----		-----	
614	IEC60567	105		0.62	
657	D3612	75.8	ex	-3.44	test result excluded, see paragraph 4.1
862	IEC60567	94		-0.91	
902	D3612	100		-0.07	
912	IEC60567	93.64	C	-0.96	first reported: 57
913		-----		-----	
963	D3612	100.3		-0.03	
974	D3612	99		-0.21	
975	D3612	99.8		-0.10	
1072	IEC60567	90.5		-1.40	
1135		-----		-----	
1137	D3612	99.20156		-0.19	
1178	IEC60567	98.35		-0.30	
1264		-----		-----	
1304	IEC60567	87.4		-1.83	
1306	In house	110.69560		1.41	
1352	IEC60567	104		0.48	
1367	IEC60567	98.715		-0.25	
1374	D3612	104		0.48	
1430	IEC60567	91		-1.33	
1435	IEC60567	110		1.32	
1442	IEC60567	98.7		-0.26	
1444		-----		-----	
1458	D3612	103		0.34	
1460	D3612	66.80	R(0.05)	-4.70	
1478	IEC60567	98.46		-0.29	
1505	D3612	68.4	R(0.05)	-4.48	
1513	IEC60567	103.06		0.35	
1545	D3612	114.2		1.90	
1560	IEC60567	100		-0.07	
1624	IEC60567	111.93		1.59	
1660	IEC60567	101.2		0.09	
1687	IEC60567	104.4		0.54	
1719	D3612	144	R(0.05)	6.05	
1743	IEC60567	100		-0.07	
1747	IEC60567	121.41		2.91	
1801	IEC60567	90		-1.47	
1885	D3612	121.1		2.86	
1888		101.5		0.13	
1890	D3612	121.90	ex	2.97	test result excluded, see paragraph 4.1
1891	IEC60567	95.0		-0.77	
1943	D3612	117.82260		2.41	
6002	IEC60567	100.4		-0.02	
6015	D3612	81.50		-2.65	
6036	IEC60567	99.9		-0.09	
6053	IEC60567	107		0.90	
6063	IEC60567	97.88		-0.37	
6067	IEC60567	85		-2.16	
6071	IEC60567	75.00	ex	-3.56	test result excluded, see paragraph 4.1
6085	D3612	115	ex	2.01	test result excluded, see paragraph 4.1
6088	IEC60567	74	ex	-3.70	test result excluded, see paragraph 4.1
6124		107.6		0.98	
6141	D3612	97.218		-0.46	
6155	IEC60567	96.78005		-0.52	
6255	IEC60567	86.9		-1.90	
6275	IEC60567	96.5		-0.56	
6278	D3612	61	R(0.05)	-5.51	
6280	D3612	88.3		-1.70	
6334	IEC60567	101		0.06	
6353	IEC60567	32.6	C,R(0.01)	-9.46	first reported: 45.4

normality	OK
n	48
outliers	6 (+5ex)
mean (n)	100.54
st.dev. (n)	8.656
R(calc.)	24.24
st.dev.(IEC60567:11)	7.181
R(IEC60567:11)	20.11

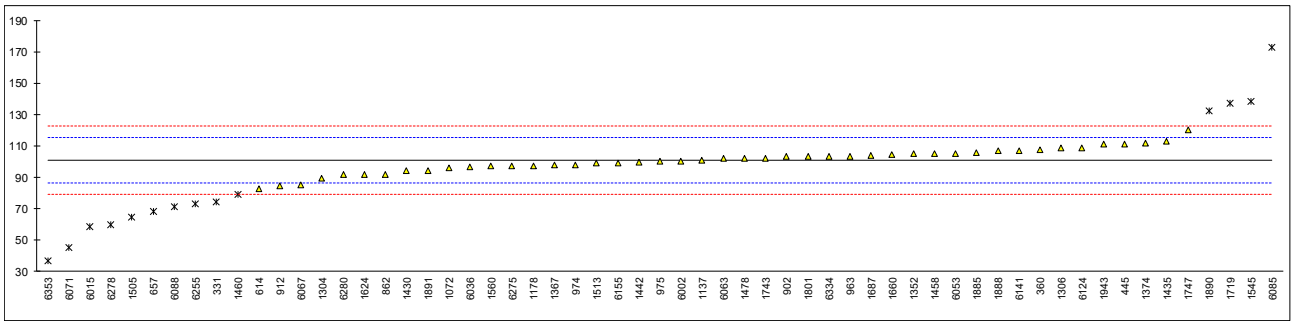


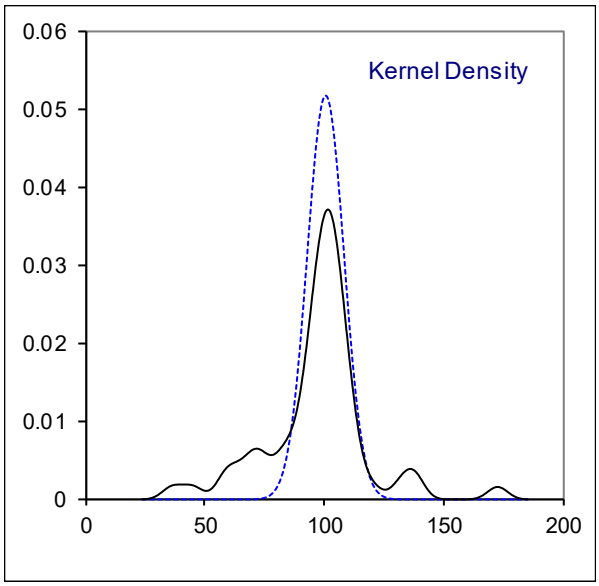


Determination of Ethyne (C_2H_2) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	74	R(0.05)	-3.73	
360	IEC60567	107.5		0.93	
445	IEC60567	111.05		1.42	
511		-----		-----	
614	IEC60567	83		-2.48	
657	D3612	68.1	R(0.05)	-4.54	
862	IEC60567	92		-1.23	
902	D3612	103		0.30	
912	IEC60567	84.40	C	-2.28	first reported: 53
913		-----		-----	
963	D3612	103.3		0.34	
974	D3612	98		-0.39	
975	D3612	100.0		-0.12	
1072	IEC60567	95.9		-0.68	
1135		-----		-----	
1137	D3612	100.65520		-0.02	
1178	IEC60567	97.12		-0.52	
1264		-----		-----	
1304	IEC60567	89.5		-1.57	
1306	In house	108.43753		1.06	
1352	IEC60567	105		0.58	
1367	IEC60567	97.57		-0.45	
1374	D3612	112		1.55	
1430	IEC60567	94		-0.95	
1435	IEC60567	113		1.69	
1442	IEC60567	99.9		-0.13	
1444		-----		-----	
1458	D3612	105		0.58	
1460	D3612	78.81	ex	-3.06	test result excluded, see paragraph 4.1
1478	IEC60567	101.95		0.16	
1505	D3612	64.8	R(0.05)	-5.00	
1513	IEC60567	98.89		-0.27	
1545	D3612	138.6	R(0.05)	5.24	
1560	IEC60567	97		-0.53	
1624	IEC60567	91.90		-1.24	
1660	IEC60567	104.7		0.54	
1687	IEC60567	104.1		0.45	
1719	D3612	137	R(0.05)	5.02	
1743	IEC60567	102		0.16	
1747	IEC60567	120.00		2.66	
1801	IEC60567	103		0.30	
1885	D3612	105.8		0.69	
1888		106.7		0.81	
1890	D3612	132.00	R(0.05)	4.33	
1891	IEC60567	94.3		-0.91	
1943	D3612	111.03524		1.42	
6002	IEC60567	100.3		-0.07	
6015	D3612	58.50	R(0.05)	-5.88	
6036	IEC60567	96.9		-0.55	
6053	IEC60567	105		0.58	
6063	IEC60567	101.83		0.14	
6067	IEC60567	85		-2.20	
6071	IEC60567	45.08	R(0.05)	-7.74	
6085	D3612	173	R(0.01)	10.02	
6088	IEC60567	71	C,R(0.05)	-4.14	first reported: 63
6124		108.9		1.12	
6141	D3612	106.875		0.84	
6155	IEC60567	99.229665		-0.22	
6255	IEC60567	73.1	R(0.05)	-3.85	
6275	IEC60567	97.11		-0.52	
6278	D3612	60	R(0.05)	-5.67	
6280	D3612	91.6		-1.28	
6334	IEC60567	103		0.30	
6353	IEC60567	36.5	C,R(0.01)	-8.93	

normality	OK
n	45
outliers	13 (+1ex)
mean (n)	100.8
st.dev. (n)	7.719
R(calc.)	21.61
st.dev.(IEC60567:11)	7.202
R(IEC60567:11)	20.17

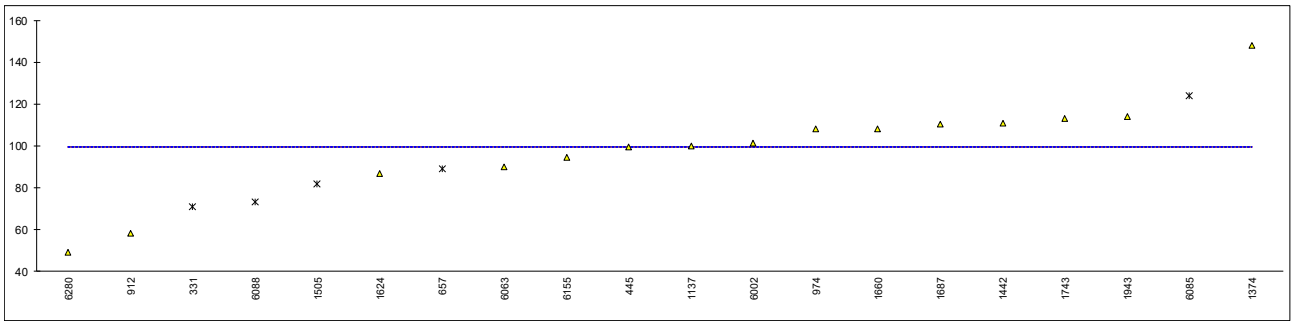


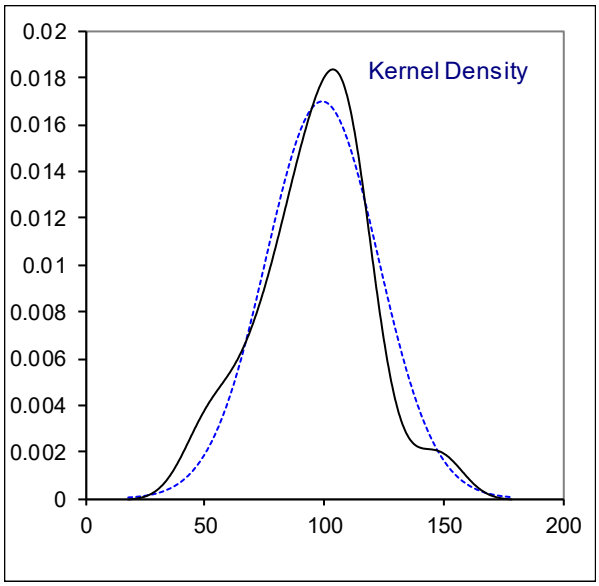


Determination of Propane (C_3H_8) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	71	ex	-----	test result excluded, see paragraph 4.1
360		-----		-----	
445	IEC60567	99.65		-----	
511		-----		-----	
614		-----		-----	
657	D3612	88.9	ex	-----	test result excluded, see paragraph 4.1
862		-----		-----	
902		-----		-----	
912	IEC60567	58		-----	
913		-----		-----	
963		-----		-----	
974	D3612	108		-----	
975		-----		-----	
1072		-----		-----	
1135		-----		-----	
1137	D3612	100.00039		-----	
1178		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1367		-----		-----	
1374	D3612	148		-----	
1430		-----		-----	
1435		-----		-----	
1442	IEC60567	110.7		-----	
1444		-----		-----	
1458		-----		-----	
1460		-----		-----	
1478		-----		-----	
1505	D3612	81.6	ex	-----	test result excluded, see paragraph 4.1
1513		-----		-----	
1545		-----		-----	
1560		-----		-----	
1624	IEC60567	86.70		-----	
1660	IEC60567	108.3		-----	
1687	IEC60567	110.4		-----	
1719		-----		-----	
1743	IEC60567	113		-----	
1747		-----		-----	
1801		-----		-----	
1885	D3612	NA		-----	
1888		-----		-----	
1890		-----		-----	
1891		-----		-----	
1943	D3612	114.21080		-----	
6002	IEC60567	101.1		-----	
6015		-----		-----	
6036		-----		-----	
6053		-----		-----	
6063	IEC60567	89.94		-----	
6067		-----		-----	
6071		-----		-----	
6085	D3612	124	ex	-----	test result excluded, see paragraph 4.1
6088	IEC60567	73	ex	-----	test result excluded, see paragraph 4.1
6124		-----		-----	
6141		-----		-----	
6155	IEC60567	94.56587		-----	
6255		-----		-----	
6275		-----		-----	
6278		-----		-----	
6280	D3612	49		-----	
6334		-----		-----	
6353		-----		-----	

normality	suspect
n	15
outliers	0 (+5ex)
mean (n)	99.44
st.dev. (n)	23.452
R(calc.)	65.66
st.dev.(IEC60567:11)	(7.103)
R(IEC60567:11)	(19.89)

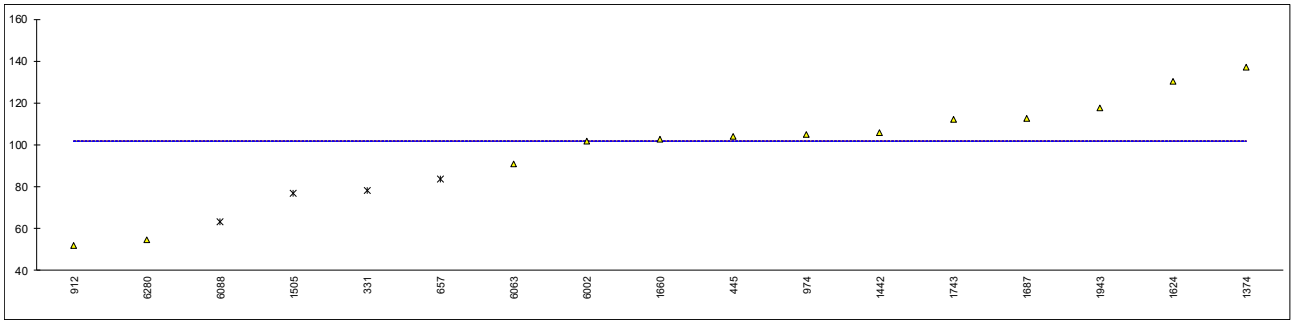


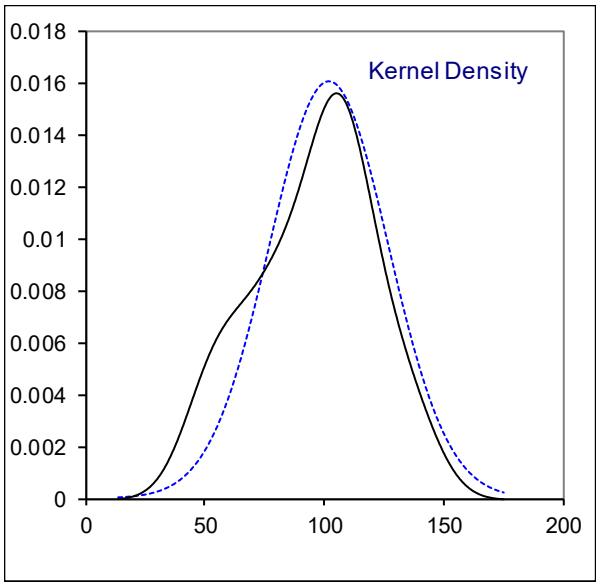


Determination of Propene (C_3H_6) on sample #20229; results in µL/L

lab	method	value	mark	z(targ)	remarks
179		-----		-----	
237		-----		-----	
331	IEC60567	78	ex	-----	test result excluded, see paragraph 4.1
360		-----		-----	
445	IEC60567	103.86		-----	
511		-----		-----	
614		-----		-----	
657	D3612	83.4	ex	-----	test result excluded, see paragraph 4.1
862		-----		-----	
902		-----		-----	
912	IEC60567	52		-----	
913		-----		-----	
963		-----		-----	
974	D3612	105		-----	
975		-----		-----	
1072		-----		-----	
1135		-----		-----	
1137		-----		-----	
1178		-----		-----	
1264		-----		-----	
1304		-----		-----	
1306		-----		-----	
1352		-----		-----	
1367		-----		-----	
1374	D3612	137		-----	
1430		-----		-----	
1435		-----		-----	
1442	IEC60567	105.7		-----	
1444		-----		-----	
1458		-----		-----	
1460		-----		-----	
1478		-----		-----	
1505	D3612	76.7	ex	-----	test result excluded, see paragraph 4.1
1513		-----		-----	
1545		-----		-----	
1560		-----		-----	
1624	IEC60567	130.45		-----	
1660	IEC60567	102.5		-----	
1687	IEC60567	112.4		-----	
1719		-----		-----	
1743	IEC60567	112		-----	
1747		-----		-----	
1801		-----		-----	
1885	D3612	NA		-----	
1888		-----		-----	
1890		-----		-----	
1891		-----		-----	
1943	D3612	117.46755		-----	
6002	IEC60567	101.7		-----	
6015		-----		-----	
6036		-----		-----	
6053		-----		-----	
6063	IEC60567	91.02		-----	
6067		-----		-----	
6071		-----		-----	
6085		-----		-----	
6088	IEC60567	63	ex	-----	test result excluded, see paragraph 4.1
6124		-----		-----	
6141		-----		-----	
6155		-----		-----	
6255		-----		-----	
6275		-----		-----	
6278		-----		-----	
6280	D3612	54.4		-----	
6334		-----		-----	
6353		-----		-----	

normality	suspect
n	13
outliers	0 (+4ex)
mean (n)	101.96
st.dev. (n)	24.824
R(calc.)	69.51
st.dev.(IEC60567:11)	(7.283)
R(IEC60567:11)	(20.39)





APPENDIX 2 Analytical details

lab	extraction method
179	---
237	---
331	---
360	Head Space
445	Head Space
511	---
614	ToGas
657	Head Space
862	Head Space
902	Head Space
912	---
913	---
963	Head Space
974	Head Space
975	Head Space
1072	Toepler
1135	---
1137	Head Space
1178	Head Space
1264	---
1304	Head Space
1306	Head Space
1352	Toepler
1367	---
1374	Head Space
1430	Head Space
1435	---
1442	Head Space
1444	---
1458	Stripper Column
1460	Head Space
1478	Toepler
1505	Head Space
1513	Toepler
1545	---
1560	Head Space
1624	Head Space
1660	Head Space
1687	Head Space
1719	Stripper Column
1743	---
1747	Head Space
1801	Head Space
1885	Head Space
1888	---
1890	Head Space
1891	Head Space
1943	Head Space
6002	Head Space
6015	Head Space
6036	Head Space
6053	Head Space
6063	Toepler
6067	Head Space
6071	Head Space
6085	---
6088	---
6124	Stripper Column
6141	Head Space
6155	Head Space
6255	Head Space
6275	Stripper Column
6278	Toepler
6280	Vacuum extraction
6334	Head Space
6353	Head Space

APPENDIX 3

Number of participants per country

7 labs in AUSTRALIA
3 labs in BELGIUM
1 lab in BOSNIA and HERZEGOVINA
1 lab in BULGARIA
1 lab in CHINA, People's Republic
1 lab in CROATIA
2 labs in FRANCE
3 labs in GERMANY
2 labs in GREECE
1 lab in HONG KONG
2 labs in INDIA
1 lab in INDONESIA
1 lab in ITALY
1 lab in LATVIA
1 lab in MALAYSIA
1 lab in MOROCCO
1 lab in NETHERLANDS
1 lab in NEW ZEALAND
1 lab in NIGERIA
1 lab in PERU
1 lab in PHILIPPINES
1 lab in POLAND
1 lab in PORTUGAL
2 labs in QATAR
4 labs in SAUDI ARABIA
3 labs in SINGAPORE
2 labs in SLOVENIA
1 lab in SOUTH AFRICA
2 labs in SOUTH KOREA
4 labs in SPAIN
1 lab in SWITZERLAND
3 labs in TURKEY
3 labs in UNITED ARAB EMIRATES
3 labs in UNITED KINGDOM
1 lab in UNITED STATES OF AMERICA
1 lab in URUGUAY

APPENDIX 4

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	= calculation difference between reported results and result calculated by iis
W	= test result withdrawn on request of participant
ex	= test result excluded from statistical evaluation
fr.	= first reported
n.a.	= not applicable
n.e.	= not evaluated
n.d.	= not detected
SDS	= Safety Data Sheet

Literature

1 iis Interlaboratory Studies, Protocol for the Organisation, Statistics and Evaluation, June 2018
2 ASTM E178:02
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7 M. Thompson and R. Wood, J. AOAC Int, 76, 926, (1993)
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12 J.N. Miller, Analyst, 118, 455, (1993)
13 Analytical Methods Committee, Technical Brief, No 4, January 2001
14 P.J. Lowthian and M. Thompson, The Royal Society of Chemistry, Analyst, 127, 1359-1364 (2002)
15 Bernard Rosner, Percentage Points for a Generalized ESD Many-Outlier Procedure, Technometrics, 25(2), 165-172, (1983).