Worldwide Open Proficiency Test for X Ray Fluorescence Laboratories

PTXRFIAEA13

Determination of Major, Minor and Trace Elements in a Clay Sample

IAEA Laboratories, Seibersdorf
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FOREWORD

The IAEA assists its Member States laboratories to continuously improve their analytical performance by producing reference materials, by developing standardized analytical methods, and by conducting inter-laboratory comparisons and proficiency tests. To ensure a reliable worldwide, rapid and consistent response, the IAEA Nuclear Science and Instrumentation Laboratory in Seibersdorf, Austria, coordinates proficiency tests for Member States laboratories.

This summary report presents the results of the worldwide proficiency test PTXRFIAEA13 on the determination of minor and trace elements in a clay sample. Methodologies, statistical analysis, and evaluation of results (for each element and for each laboratory) are also reported. The test was carried out within the IAEA project Nuclear Instrumentation, under the Accelerators and Nuclear Spectrometry Subprogram, Nuclear Science Program. The main objective of the project is to enhance capability of interested Member States in effective utilization of nuclear spectrometry and analytical services in industry, human health, agriculture, and in monitoring and evaluation of the environment.

This proficiency test was designed to identify potential analytical problems, to support IAEA Member States laboratories to improve the quality of their analytical results, to maintain their accreditation and to provide a regular forum for discussion and technology transfer in this topic.

The coordinator of the proficiency test and responsible for this publication was Mr. A. Migliori of the IAEA Nuclear Science and Instrumentation Laboratory, Seibersdorf (Austria).

1. INTRODUCTION

The PTXRFIAEA13 proficiency test was aimed at analytical laboratories applying X-ray fluorescence (XRF) techniques in environmental monitoring. The participants were requested to use their established and proven analytical procedures for the determination of concentrations of chemical elements in a clay sample.

Clay samples with established homogeneity and well characterized known target values of the mass fractions of analytes were distributed to participating laboratories. The laboratories were requested to analyze the sample using established techniques following their analytical procedures. Based on the results of the proficiency test presented in this report, each participating laboratory should assess its analytical performance by using the specified criteria and, if appropriate, to identify discrepancies, and to correct relevant analytical procedures.

The samples, together with detailed instructions for analysts, were distributed to the participating laboratories in January 2017. The deadline for submission of the results was March 17, 2017. The last results were received on October 2017. The submitted results were processed, grouped versus analytes/laboratories and compared with the analyte's assigned values. The values of *z*- and of *u*-scores were calculated for three fit-for-purpose levels. For the definitions of the *z*- and *u*-scores please see Section 3.2. The obtained results as well as the description of the data evaluation procedures are described in this report. Each laboratory was assigned a code, therefore full anonymity of the presented results is guaranteed. The link between the laboratory code and the laboratory name is known only to the organizers of the proficiency test and to the laboratory itself.

2. DESCRIPTION OF THE TEST SAMPLE

The test sample was a clay sample material prepared and tested by an external independent laboratory. The powdered, homogenized, and dried material was distributed to 66 laboratories in sealed plastic bottles, each bottle containing 100 g of the test sample. The participants were asked to conduct the determination of the mass fractions of chemical elements making up the sample according to their routine analytical procedures. They were also instructed to determine the moisture content of the material by using a separate sample and to report the results on a dry-weight basis. Only one result per element per analytical technique should be submitted. Each result should be accompanied by an estimate of its uncertainty expressed as one standard deviation. No restriction on the number of the reported elements was imposed.

3. DETAILS OF THE EXERCISE

3.1. ASSIGNED VALUE AND TARGET STANDARD DEVIATION

The reference values supplied by the provider of the material, established by independent inter-laboratory survey, were used as the assigned values of the analytes, X_A. The results for 51 analytes were submitted by participants of this proficiency test.
The *z*- and *u*-scores were calculated for all the submitted results of all analytes except 22 elements, for which the assigned values were not available.
For each analyte a target value of the standard deviation has been assigned using a modified Horwitz function as proposed in the reference [1]:

$$H_A = \begin{cases} 0.22 X_A & X_A < 1.2 \cdot 10^{-7} \\ 0.02 (X_A)^{0.8495} & 1.2 \cdot 10^{-7} \le X_A \le 0.138 \\ 0.01 \sqrt{X_A} & X_A > 0.138 \end{cases} \quad (1)$$

In Eqn. (1) the assigned value of analyte, X_A, is expressed as a mass fraction. The target value of the standard deviation, σ_A is related to H_A by a factor k:

$$\sigma_A = k H_A, \quad k = 0.5, 1.0, 1.5 \quad (2)$$

Depending on the value of the factor k the target value of the standard deviation is recognized as fit-for-purpose at three levels of uncertainty: k = 0.5 - appropriate for high precision analysis; k = 1.0 - appropriate for well-established routine analysis; k = 1.5 - satisfactory for common analytical tasks. The relative value of the target standard deviation, *RSD*, expressed in per cent, is defined as follows:

$$RSD = \frac{\sigma_A}{X_A} \cdot 100\% \quad (3)$$

The relative value of the target standard deviation as a function of the assigned mass fraction of the analyte, X_A, is shown in Fig. 1 for the three different values of the k factor.

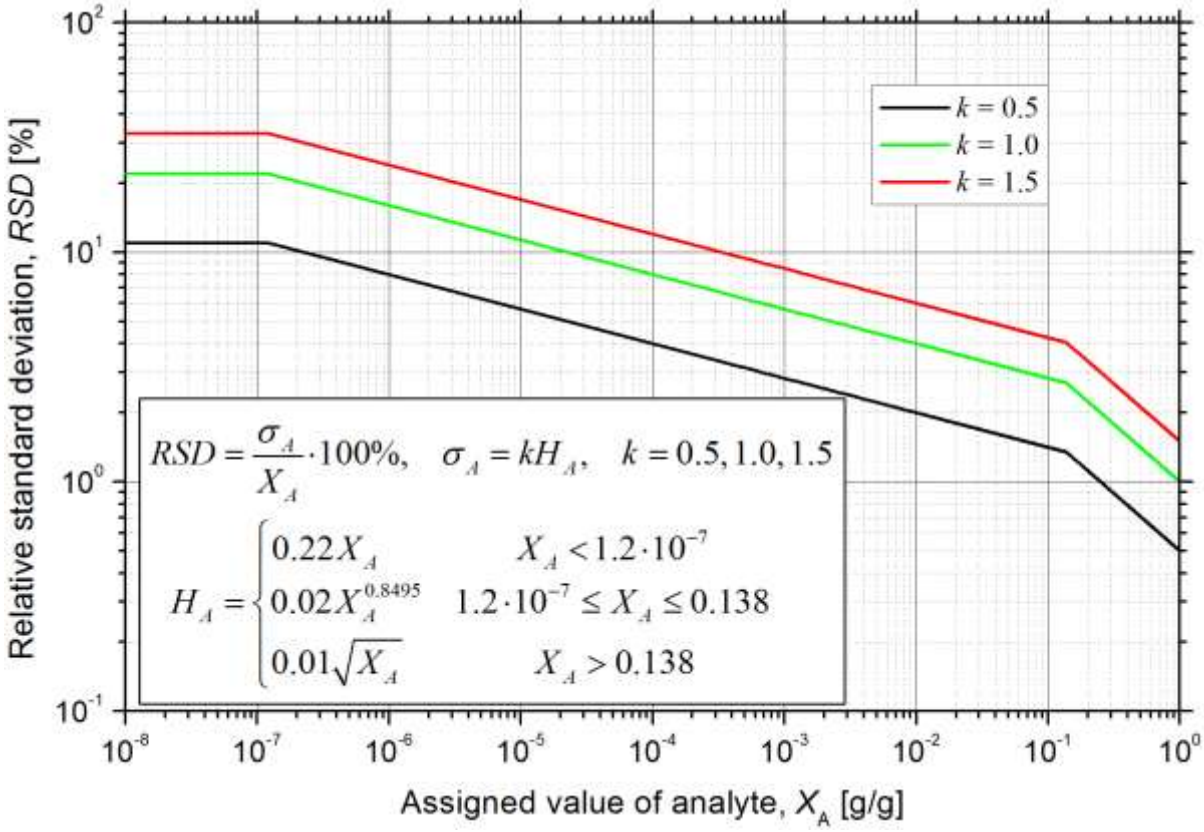

FIG. 1. Relative value of the target standard deviation, RSD, as a function of the assigned mass fraction of the analyte, X_A, calculated by using a modified Horwitz function, Eqn. (1).

3.2. *z*-SCORES AND *u*-SCORES

The reported concentrations of analytes were compared with the assigned values by using the *z*-score analysis. For every result a *z*-score was calculated:

$$z = \frac{x - X_A}{\sigma_A} \tag{4}$$

The term '*x*' denotes the reported mass fraction of analyte. Defined by different fit-for-purpose ranges of the target standard deviation, three different values of *z*-scores were calculated by combining Eqns. (2) and (4). Assuming that appropriate values for X_A and σ_A have been used and that the underlying distribution of analytical errors is normal, apart from outliers, in a well-behaved analytical system *z*-scores would be expected to fall outside the range $-2 \le z \le 2$ in about 4.6% of instances, and outside the range $-3 < z < 3$ only in about 0.3%. Therefore, based on the *z*-scores, the following decision limits were established:

$$\begin{aligned} |z| &\le 2 && \text{- a satisfactory result} \\ 2 < |z| &< 3 && \text{- the result is considered questionable} \\ |z| &\ge 3 && \text{- the result is considered unsatisfactory} \end{aligned} \tag{5}$$

The advice to the laboratory is that, independent of the fit-for-purpose range selected by the laboratory, any *z*-score for an element outside the range $-2 \le z \le 2$ should be examined by the analyst and all steps of the analytical procedure verified to identify the source(s) of the analytical bias.

For every participant the rescaled sum of *z*-scores, *RSZ*, as well as the sum of squared *z*-scores, *SSZ*, were calculated as defined by the following equations:

$$RSZ = \frac{\sum_{i=1}^{L} z_i}{\sqrt{L}} \tag{6}$$

$$SSZ = \sum_{i=1}^{L} (z_i)^2 \tag{7}$$

The symbol '*L*' denotes the number of results provided by the laboratory/participant for all the analytes determined. The summing up in Eqns. (6) and (7) takes into account all *z*-scores for all analytes with known assigned values reported by participant. The *RSZ* can be interpreted as a standardized normally distributed variable, with expected value equal to zero and unit variance. It is sensitive in detecting a small consistent bias in an analytical system, however, it is not sensitive in cases where there are even big errors but having opposite signs. The *SSZ* takes no account of the signs because it depends on the squared *z*-scores. It has a chi-squared (χ^2) distribution with *L* degrees of freedom. The *SSZ* can be regarded as complementary to *RSZ*, which means that if *RSZ* is well within the range $-3 < RSZ < 3$ and if at the same time the value of *SSZ* is above the $\chi^2_{critical}$ value the overall performance of the laboratory requires improvement.

The reported results were accompanied by the standard uncertainty estimate made by the participant. The values were used to calculate the *u*-scores:

$$u = \frac{|x - X_A|}{\sqrt{(\sigma_A)^2 + (\sigma_x)^2}} \tag{8}$$

The symbol 'σ_x' denotes the standard uncertainty of the submitted result *x*. If the assumptions about X_A and σ_A and about the normality of the underlying distributions are correct, and the laboratory estimate of σ_x takes into account all the significant sources of uncertainty, the *u*-scores would have a truncated normal distribution with unit variance. In a well-behaved analytical system only 0.1% of *u*-scores would fall outside the range $u < 3.29$. Therefore, the following decision limits for the *u*-scores were established:

$u \leq 1.64$ - reported result does not differ from the assigned value
$1.64 < u \leq 1.95$ - reported result probably does not differ from the assigned value
$1.95 < u \leq 2.58$ - it is not clear whether the reported and assigned values differ (9)
$2.58 < u \leq 3.29$ - reported result is probably different from the assigned value
$3.29 < u$ - reported result differs from the assigned value

The *u*-scores are especially useful for deciding whether the laboratory fit-for-purpose criteria are fulfilled. By comparing Eqn. (4) and Eqn. (8) one can notice that for corresponding values of *u*-score and *z*-score the following inequality is always fulfilled:

$$u \leq |z| \tag{10}$$

It implies that if the *u*-score is larger than 3.29 also the decision limit for the corresponding *z*-score is triggered and the laboratory has to check the analytical procedure as well as review the uncertainty budget estimation. If *u*-score stays below the value of 1.64 and at the same time the *z*-score decision limit is triggered ($|z| > 3$) the laboratory should reevaluate its fit-for-purpose status for that particular analyte.

3.3. CONSENSUS VALUES

To examine the overall performance of the participating laboratories the submitted results have been statistically processed and the consensus values were calculated. The results were tested for the presence of outliers using a set of seven outlier rejection tests, shown below:

Description of symbols:
$x_1 < ... < x_n$ - set of analytical results
$\bar{x}$ - mean value (11)
s - standard deviation

1. Coefficient of kurtosis [2], number of results: $5 \leq n \leq 100$, two-sided test, confidence level = 0.95:

$$b_2 = \frac{n\sum_{i=1}^{n}(\bar{x} - x_i)^4}{\left[\sum_{i=1}^{n}(\bar{x} - x_i)^2\right]^2} \tag{12}$$

If b_2 > critical value then reject the result that is at the furthest distance from the mean, decrease n, repeat the procedure until $b_2 \leq$ critical value.

2. Coefficient of skewness [2], number of results, $5 \leq n \leq 60$, one-sided test, confidence level = 0.95:

$$\sqrt{b_1} = \frac{\sqrt{n}\sum_{i=1}^{n}(x_i - \bar{x})^3}{\left[\sum_{i=1}^{n}(x_i - \bar{x})^2\right]^{3/2}} \tag{13}$$

If $\left|\sqrt{b_1}\right|$ > critical value then: if $\sqrt{b_1}$ is positive then reject x_n, otherwise reject x_1, decrease n, repeat the procedure until $\left|\sqrt{b_1}\right| \leq$ critical value.

3. Veglia's test [3,4], number of results: $4 \leq n \leq \infty$, two-sided test, confidence level = 0.95:

$$h = \sqrt{\frac{n}{n-1}}\,\frac{|x_k - \bar{x}_{n-1}|}{s_{n-1}} \tag{14}$$

where:
x_k, examined value, the result at the furthest distance from the mean
$\bar{x}_{n-1}$, the mean value of the population of the results with the examined result excluded
s_{n-1}, the standard deviation of the population of the results with the examined result excluded
If h > critical value then reject x_k otherwise temporarily exclude the x_k from the population of results and proceed with testing the next outlier candidate, if the following value of h > critical value then reject both results, decrease n respectively, repeat the procedure until $h \leq$ critical value.

4. Dixon's test [5], number of results: $3 \leq n \leq 25$, two-sided test, confidence level = 0.95:

If x_1 is at the furthest distance from the mean value, then calculate:

$$r = \begin{cases} (x_2 - x_1)/(x_n - x_1), & 3 \le n \le 7 \\ (x_2 - x_1)/(x_{n-1} - x_1), & 8 \le n \le 10 \\ (x_3 - x_1)/(x_{n-1} - x_1), & 11 \le n \le 13 \\ (x_3 - x_1)/(x_{n-2} - x_1), & 14 \le n \le 25 \end{cases} \quad (15a)$$

If x_n is at the furthest distance from the mean value then calculate:

$$r = \begin{cases} (x_n - x_{n-1})/(x_n - x_1), & 3 \le n \le 7 \\ (x_n - x_{n-1})/(x_n - x_2), & 8 \le n \le 10 \\ (x_n - x_{n-2})/(x_n - x_2), & 11 \le n \le 13 \\ (x_n - x_{n-2})/(x_n - x_3), & 14 \le n \le 25 \end{cases} \quad (15b)$$

If r > critical value then reject the tested result, decrease n, repeat the procedure until $r \le$ critical value.

5. Outlier rejection test proposed in [2], number of results: $4 \le n \le 100$, two-sided test, confidence level = 0.95:

$$w/s = (x_n - x_1)/s \quad (16)$$

If w/s > critical value then: if $x_n - \bar{x} = \bar{x} - x_1$, reject both x_1 and x_n, otherwise reject x_k ($x_k = x_1$ *or* $x_k = x_n$), the result that is at the furthest distance from the mean, for the remaining population of results ($n' = n - 1$) calculate: $T_k = |\bar{x}' - x_k|/s'$, where: $\bar{x}'$ is the mean value and s' is the standard deviation of the population of the results excluding the rejected value x_k, if $T_k >$ critical value then reject also the second extreme result, decrease n respectively, repeat the procedure until $w/s \le$ critical value.

6. Outlier rejection test proposed in [6], number of results: $3 \le n < \infty$, two-sided test, confidence level = 0.95:

$$B_4 = |x_k - \bar{x}|/s \quad (17)$$

where:
x_k, examined value

If $B_4 >$ critical value then reject the tested result, repeat the procedure until $B_4 \le$ critical value.

7. Outlier rejection test proposed in [7], number of results: $3 \le n \le 100$, two-sided test, confidence level = 0.95:

$$S_k^2/S = \frac{\sum_{i=1, i \ne k}^{n} (x_i - \bar{x}')^2}{\sum_{i=1, i \ne k}^{n} (x_i - \bar{x})^2}, \quad k = 1 \text{ or } k = n \quad (18)$$

where:

x_k, examined value, the result at the furthest distance from the mean

$\bar{x}'$, the mean value of the population of the results with the examined result x_k excluded

If $S_k^2 / S >$ critical value then reject x_k, decrease n, repeat the procedure until $S_k^2 / S \leq$ critical value.

The results which passed the outlier rejection procedures were used to calculate the consensus mean value of analyte, X_C, and corresponding consensus value of its standard deviation, σ_C:

$$X_C = \frac{\sum_{i=1}^{m} x_i}{m} \tag{19}$$

and

$$\sigma_C = \sqrt{\frac{\sum_{i=1}^{m} (x_i - X_C)^2}{m(m-1)}} \tag{20}$$

The term m denotes the number of reported values for a given analyte excluding the outliers rejected by at least one of the outlier rejections tests. The summing up in Eqn. (19) and (20) takes into account only the results which passed all the outlier rejection tests. The obtained consensus values were compared with the assigned values of the analytes.

4. RESULTS

The test sample was distributed to 66 laboratories for chemical composition analysis. Out of the 66 laboratories, 47 participated in the test submitting 800 individual results for 51 chemical elements. The list of the participating laboratories is presented at the end of this report.

The techniques used by the participants and their codes are listed in Table 1.

TABLE 1. THE CODING, DESCRIPTION AND THE ABBREVIATED NAMES OF THE ANALYTICAL TECHNIQUES USED BY PARTICIPANTS OF THE PROFICIENCY TEST EXERCISE

Technique Code	Description	Abbreviation
1.0	Energy dispersive X-ray fluorescence	EDXRFS
1.1	EDXRF, radioisotope excitation	EDXRFISOTOP
1.2	EDXRF, X-ray tube excitation	EDXRFTUBE
1.3	EDXRF, excitation using X-ray tube and secondary targets	EDXRFTUBE-ST
1.4	Total reflection X-ray fluorescence	TXRF
2.0	Wavelength dispersive X-ray fluorescence	WDXRF
4.5	Particle Induced X-ray Emission + Particle Induced Gamma-ray Emission	PIXE+PIGE
5.0	Neutron Activation Analysis	NAA

The techniques EDXRFS, EDXRFISOTOP, and EDXRFTUBE should be considered of similar type. The distinction between them (EDXRFISOTOP or EDXRFTUBE) was based on information provided by the participants. In the case that insufficient information was available a generic type technique EDXRFS was assumed. All submitted results have been evaluated.

In Table 2 a summary of the assigned analyte values, the target values of standard deviation (obtained by using modified Horwitz function), the consensus values and their standard deviations are shown. For 22 elements the assigned and target values were not available. The consensus values (Eqn. 19) and corresponding standard deviations (Eqn. 20) were calculated based on 682 reported analytical results after excluding 118 results classified as outliers. The correlation between the assigned and the consensus values is shown in Fig. 2.

TABLE 2. THE ASSIGNED VALUES OF ANALYTES, THE TARGET VALUES OF THE STANDARD DEVIATIONS AND THE CONSENSUS VALUES. THE ASSIGNED VALUES OF THE ELEMENTS SHOWN IN ITALICS SHOULD BE CONSIDERED AS INDICATIVE

Analyte symbol	Assigned value of the analyte, X_A	Target value of standard deviation, σA			Consensus value of the analyte, X_C	Consensus value of the standard deviation, σ_C	Number of results	Number of outliers
		k = 0.5	k = 1.0	k = 1.5				
	[g/kg]							
Al	100.00	1.41	2.83	4.24	81.94	6.53	27	1
Ca	15.40	0.2886	0.5772	0.8658	15.95	0.2852	41	7
Fe	53.80	0.8352	1.67	2.51	53.76	0.8243	46	6
K	1.17	0.0323	0.0646	0.0976	1.24	0.0666	33	5
Mg	11.90	0.2318	0.4637	0.6955	13.04	1.01	21	2
Mn	1.48	0.0395	0.0789	0.1184	1.40	0.0510	42	4
Na	1.50	0.0399	0.0798	0.1197	1.58	0.1221	15	4
Si	261.00	2.55	5.11	7.66	265.18	5.63	25	4
	[mg/kg]							
Ag	-	-	-	-	3.52	1.29	3	1
As	*4.62*	*0.2935*	*0.5870*	*0.8805*	*4.65*	*0.57*	*18*	*2*
Ba	*431*	*13.84*	*27.67*	*41.51*	*429.56*	*30.05*	*21*	*2*
Bi	-	-	-	-	2.92	0.43	1	0
Br	*0.925*	*0.0749*	*0.1497*	*0.2246*	*3.27*	*1.02*	*5*	*0*
C	-	-	-	-	23668.00	268.00	1	0
Cd	*0.425*	*0.0387*	*0.0773*	*0.1160*	*1.15*	*0.70*	*1*	*0*
Ce	-	-	-	-	33.18	1.69	7	1
Cl	-	-	-	-	93.13	32.73	7	2
Co	*17.3*	*0.9010*	*1.80*	*2.70*	*17.11*	*1.53*	*15*	*1*
Cr	*15*	*0.7982*	*1.60*	*2.39*	*19.83*	*2.65*	*21*	*8*
Cs	-	-	-	-	2.57	0.23	3	0
Cu	54.8	2.40	4.80	7.20	51.36	3.32	37	2
Eu	-	-	-	-	1.33	0.10	4	1
Ga	*25*	*1.23*	*2.46*	*3.70*	*17.90*	*1.22*	*23*	*5*
Hf	-	-	-	-	2.84	0.13	6	2
Hg	*1.77*	*0.1299*	*0.2598*	*0.3897*	*3.20*	*1.04*	*4*	*0*
La	-	-	-	-	16.55	1.74	9	1
Lu	-	-	-	-	0.44	0.07	2	0
Mo	*3.84*	*0.2508*	*0.5017*	*0.7525*	*1.06*	*0.23*	*2*	*0*
Nb	-	-	-	-	4.34	0.16	14	5
Nd	-	-	-	-	14.50	2.84	3	0

Analyte symbol	Assigned value of the analyte, X_A	Target value of standard deviation, σA			Consensus value of the analyte, X_C	Consensus value of the standard deviation, σ_C	Number of results	Number of outliers
		k = 0.5	k = 1.0	k = 1.5				
	[mg/kg]							
Ni	*8.94*	*0.5142*	*1.03*	*1.54*	*8.29*	*1.06*	*9*	*3*
P	123	4.77	9.54	14.31	99.36	11.71	15	8
Pb	*18.5*	*0.9538*	*1.91*	*2.86*	*15.70*	*0.79*	*27*	*7*
Rb	*16*	*0.8431*	*1.69*	*2.53*	*16.41*	*0.66*	*36*	*8*
S	*83.5*	*3.43*	*6.86*	*10.29*	*152.93*	*35.81*	*9*	*1*
Sb	*0.6*	*0.0518*	*0.1037*	*0.1555*	*0.30*	*0.02*	*1*	*0*
Sc	-	-	-	-	16.89	0.30	9	3
Sm	-	-	-	-	3.32	1.29	3	0
Sn	*11*	*0.6133*	*1.23*	*1.84*	*8.02*	*6.53*	*2*	*0*
Sr	150	5.64	11.29	16.93	136.61	3.89	42	6
Ta	-	-	-	-	0.41	0.17	3	1
Tb	-	-	-	-	0.72	0.08	1	0
Th	-	-	-	-	6.42	0.59	16	0
Ti	-	-	-	-	4418.25	162.97	40	1
U	-	-	-	-	1.52	0.30	7	1
V	-	-	-	-	149.63	10.58	25	0
W	-	-	-	-	1.60	0.30	1	0
Y	*31*	*1.48*	*2.96*	*4.44*	*27.71*	*2.00*	*23*	*4*
Yb	-	-	-	-	1.97	0.40	3	0
Zn	66.2	2.82	5.63	8.45	61.58	2.36	41	6
Zr	*135*	*5.16*	*10.32*	*15.48*	*134.53*	*7.89*	*30*	*3*

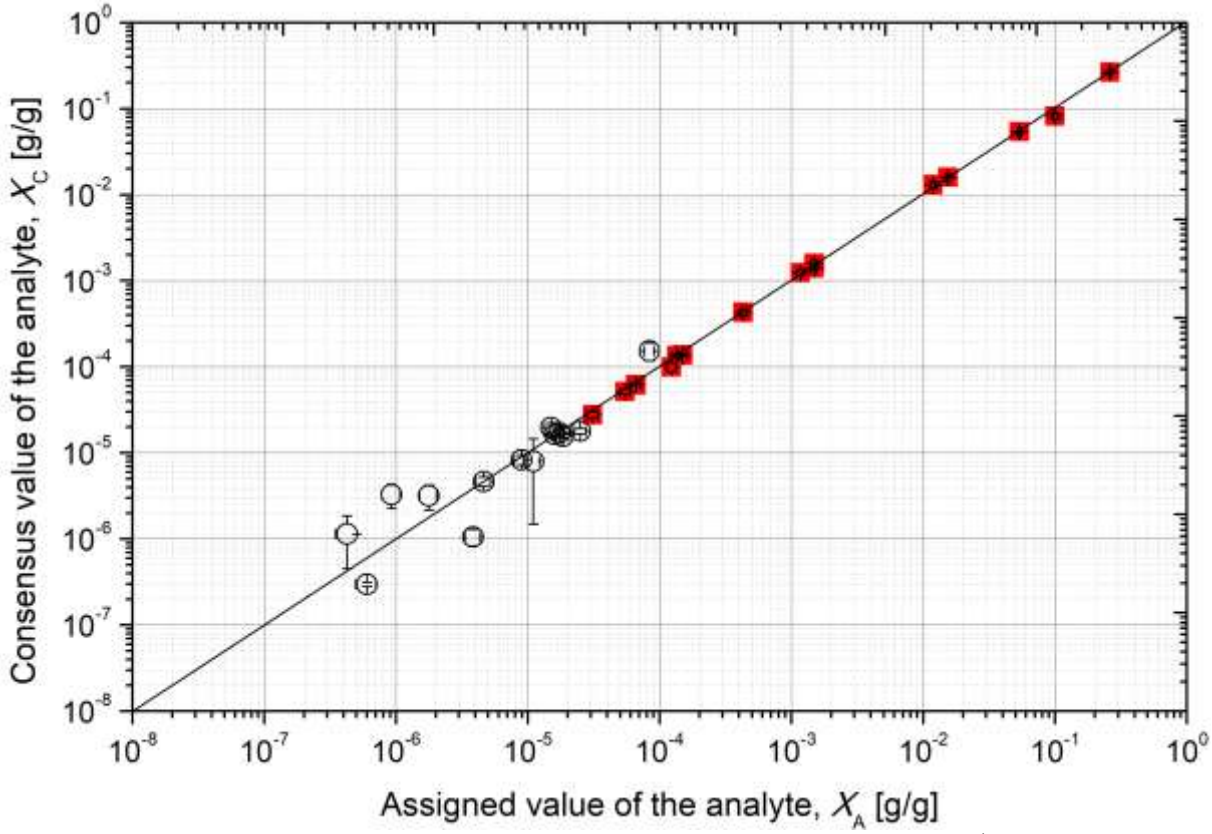

FIG. 2. Correlation between assigned, X_A, and consensus values of analytes, X_C[1].

[1] Solid red squares correspond to the elements the assigned values of which were known with high degree of accuracy. Hollow black circles correspond to the elements the assigned values of which can be considered as indicative/informative only. The uncertainties of the assigned values were calculated according to Eqn. (2) with $k = 1$. The uncertainties of the consensus values were calculated according to Eqn. (20), except for the results reported by a single laboratory, in such a case the laboratory estimate of the uncertainty was shown in the plot.

Table 3 lists the values of the *z*- and *u*-scores for all submitted results. In brackets next to the element symbol the assigned values of element concentration and the target standard deviation for $k = 1$ are shown. The *z*- and *u*-scores were calculated for the three different fit-for-purpose ranges, as defined by Eqn. (2). The results rejected by the outliers rejection procedures were marked with "*" in the "Analyte concentration" column.

Table 4 shows the combined *z*-scores for the three different fit-for-purpose ranges, the *RSZ* and *SSZ* as defined in Eqns. (6) and (7), for the participating laboratories. The analytes without assigned values were not considered.

Figs. 3-35 and 36-58 present the distributions of the proficiency test results. In Figs 3-35 the individual results are marked with filled circles. The dotted lines show the range of the accepted results (these results were used to calculate the consensus values). The outliers are marked with arrows. Also shown are the estimated parameters of the distribution (after outlier rejection): mode, median, and the mean value. For few elements, the result of density distributions could only be used as indicators of the trends observed in the reported data due to the limited number of results (only density distributions of analytes for which at least 5 results passed the outlier rejection tests are shown). All the populations of results, after outlier rejection, have passed a normality test (Kolmogorov-Smirnov). Figs. 36-58 show the bar chart distributions of the *z*-scores for the analytes with at least 6 submitted results. The results are sorted in ascending order versus laboratory/technique code. The bar charts show the distance between the reported and the assigned values of the analyte. The submitted results and their uncertainties are marked with filled squares accompanied by uncertainty bars. The horizontal lines show the admissible levels of z-score, $|z| < 2$, for three different ranges defined by factor k in Eqn. (2): $k = 0.5$ (solid black lines), $k = 1.0$ (solid green lines) and $k = 1.5$ (solid red lines). The decision levels of satisfactory results, $|z| < 2$, for different fit-for-purpose targets have also been marked.

For every participating laboratory its overall performance is presented in Figs. 59-105. The plots presented in this figure relate all the *u*-scores and *z*-scores calculated for a given laboratory. The hollow symbols denote the values calculated for specific fit-for-purpose levels as defined in Eqn. (2) with factor k, namely: $k = 0.5$ (black triangles), $k = 1.0$ (green circles), and $k = 1.5$ (red squares). The decision limits of unsatisfactory results were marked with black lines ($|z| > 3$, $u > 3.29$). They divide the plot area in four quadrants. Due to inequality (10) all the points accompanied by a laboratory estimate of the uncertainty fall always below the line $u = |z|$. The smaller the laboratory estimate of the uncertainty the closer the related point to the $u = |z|$ line. Points in the immediate proximity of the dashed diagonal line ($u = |z|$) have underestimated uncertainty values. The well performing laboratories would have more points located in the lower-left quadrant of the plot. If there are many points located in the upper-right quadrant it suggests that these results do not fall in the defined fit-for-purpose targets and that the laboratory provided too "narrow" uncertainty estimate.

Fig. 106 shows the partitioning of the results between different analytical techniques. The largest fraction of analyses was carried out with the energy dispersive spectrometry, whereas about 15% with wavelength dispersive mode. NAA and PIXE/PIGE account for about 10% of the total results.

TABLE 3. SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
Al (100 ± 2.83) [g/kg]										
120	1.4	0.02	0.00	3.41	-70.70	-35.35	-23.57	70.70	35.35	23.57
77	1.3	18	2.00	11.11	-57.98	-28.99	-19.33	33.48	23.67	17.48
136	1.0	46.95	1.54	3.29	-37.51	-18.76	-12.50	25.34	16.46	11.75
124	1.2	49.73	0.04	0.08	-35.55	-17.78	-11.85	35.54	17.77	11.85
65	1.3	51.35	4.56	8.88	-34.40	-17.20	-11.47	10.19	9.07	7.81
100	1.2	51.62	0.84	1.63	-34.21	-17.10	-11.40	29.38	16.39	11.18
73	1.2	56.87	5.30	9.33	-30.50	-15.25	-10.17	7.86	7.17	6.35
128	1.4	61.5	3.01	4.90	-27.23	-13.61	-9.08	11.56	9.31	7.40
116	1.4	70.18	3.59	5.12	-21.09	-10.54	-7.03	7.72	6.52	5.36
75	1.0	71.71	2.63	3.67	-20.00	-10.00	-6.67	9.48	7.33	5.67
53	2.0	80.6	6.50	8.06	-13.72	-6.86	-4.57	2.92	2.74	2.50
37	1.2	87.06	0.34	0.39	-9.15	-4.58	-3.05	8.89	4.54	3.04
76	2.0	91.67	0.43	0.47	-5.89	-2.95	-1.96	5.64	2.91	1.95
131	1.2	92.23	0.18	0.19	-5.50	-2.75	-1.83	5.45	2.74	1.83
127	1.3	95.76	5.48	5.72	-3.00	-1.50	-1.00	0.75	0.69	0.61
98	2.0	96	2.00	2.08	-2.83	-1.41	-0.94	1.63	1.15	0.85
85	1.3	96.58	4.57	4.73	-2.42	-1.21	-0.81	0.72	0.64	0.55
126	1.3	96.87	4.77	4.92	-2.21	-1.11	-0.74	0.63	0.56	0.49
113	2.0	101.74	0.08	0.07	1.23	0.62	0.41	1.23	0.62	0.41
74	2.0	103.16	0.00	0.00	2.24	1.12	0.75	2.24	1.12	0.75
115	2.0	106.1	2.20	2.07	4.31	2.16	1.44	2.33	1.70	1.28
78	1.0	106.67	0.67	0.62	4.71	2.36	1.57	4.27	2.29	1.55
133	4.5	107.8	3.20	2.97	5.52	2.76	1.84	2.23	1.83	1.47
69	1.1	115	14.80	12.87	10.61	5.30	3.54	1.01	1.00	0.97
119	1.0	122.19	12.89	10.55	15.69	7.85	5.23	1.71	1.68	1.64
132	1.0	152.98	0.20	0.13	37.46	18.73	12.49	37.09	18.68	12.47
63	1.0	761.39*	0.91	0.12	467.69	233.84	155.90	393.30	222.61	152.43
Ca (15.4 ± 0.58) [g/kg]										
120	1.4	1.12*	0.01	1.13	-49.48	-24.74	-16.49	49.44	24.74	16.49
129	1.0	3.68*	0.24	6.41	-40.62	-20.31	-13.54	31.47	18.80	13.07
104	1.4	4.97*	0.04	0.71	-36.13	-18.06	-12.04	35.86	18.03	12.03
95	1.4	9*	0.60	6.67	-22.18	-11.09	-7.39	9.61	7.69	6.08
128	1.4	9.47*	0.55	5.78	-20.54	-10.27	-6.85	9.58	7.45	5.79
37	1.2	12.92	0.04	0.31	-8.59	-4.30	-2.86	8.51	4.29	2.86
89	1.3	13.02	0.35	2.67	-8.25	-4.12	-2.75	5.27	3.53	2.55
90	1.3	13.3	0.40	3.01	-7.28	-3.64	-2.43	4.26	2.99	2.20
73	1.2	13.4	0.06	0.45	-6.94	-3.47	-2.31	6.79	3.45	2.31
76	2.0	14	0.12	0.88	-4.85	-2.43	-1.62	4.46	2.37	1.60
135	1.0	14.33	0.94	6.53	-3.71	-1.86	-1.24	1.09	0.98	0.84
55	5.0	14.39	0.86	6.00	-3.49	-1.75	-1.16	1.11	0.97	0.82
61	5.0	14.7	1.80	12.24	-2.43	-1.21	-0.81	0.38	0.37	0.35
96	1.1	15.1	0.76	5.00	-1.04	-0.52	-0.35	0.37	0.32	0.26
63	1.0	15.27	0.23	1.51	-0.44	-0.22	-0.15	0.34	0.20	0.14
98	2.0	15.3	0.50	3.27	-0.35	-0.17	-0.12	0.17	0.13	0.10
116	1.4	15.41	0.36	2.33	0.05	0.02	0.02	0.03	0.02	0.01

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
102	1.3	15.56	2.18	13.99	0.56	0.28	0.19	0.07	0.07	0.07
53	2.0	15.6	1.20	7.69	0.69	0.35	0.23	0.16	0.15	0.14
74	2.0	15.72	0.00	0.00	1.12	0.56	0.37	1.12	0.56	0.37
85	1.3	15.82	0.57	3.60	1.46	0.73	0.49	0.66	0.52	0.41
113	2.0	15.86	0.03	0.21	1.60	0.80	0.53	1.59	0.80	0.53
115	2.0	15.9	1.20	7.55	1.73	0.87	0.58	0.41	0.38	0.34
124	1.2	15.91	0.02	0.13	1.76	0.88	0.59	1.76	0.88	0.59
136	1.0	15.96	0.33	2.08	1.95	0.98	0.65	1.28	0.85	0.61
56	1.3	16.27	0.80	4.92	3.03	1.51	1.01	1.03	0.89	0.74
71	1.1	16.3	1.80	11.04	3.12	1.56	1.04	0.49	0.48	0.45
133	4.5	16.34	0.82	5.02	3.26	1.63	1.09	1.08	0.94	0.79
65	1.3	16.37	1.45	8.87	3.36	1.68	1.12	0.66	0.62	0.57
77	1.3	16.7	1.20	7.19	4.50	2.25	1.50	1.05	0.98	0.88
72	1.4	17.13	0.83	4.82	6.00	3.00	2.00	1.98	1.72	1.45
127	1.3	17.24	3.62	20.98	6.36	3.18	2.12	0.51	0.50	0.49
69	1.1	17.8	2.28	12.81	8.32	4.16	2.77	1.04	1.02	0.98
126	1.3	17.9	0.89	4.95	8.68	4.34	2.89	2.68	2.37	2.02
24	1.1	18.11	0.83	4.58	9.38	4.69	3.13	3.08	2.68	2.26
101	1.0	18.3	0.25	1.37	10.05	5.02	3.35	7.60	4.61	3.22
119	1.0	18.44	1.11	6.00	10.52	5.26	3.51	2.65	2.43	2.16
75	1.0	18.83	0.12	0.61	11.89	5.95	3.96	11.05	5.83	3.93
78	1.0	19.3	0.04	0.20	13.51	6.76	4.50	13.40	6.74	4.50
131	1.2	24.14*	0.02	0.08	30.30	15.15	10.10	30.24	15.14	10.10
100	1.2	40.5*	3.40	8.39	86.96	43.48	28.99	7.36	7.28	7.16
				Fe (53.8 ± 1.67) [g/kg]						
36	1.0	5*	0.01	0.20	-58.43	-29.21	-19.48	58.42	29.21	19.48
120	1.4	5.28*	0.01	0.27	-58.10	-29.05	-19.37	58.09	29.05	19.37
95	1.4	31*	2.00	6.45	-27.30	-13.65	-9.10	10.52	8.75	7.11
104	1.4	34.39*	0.19	0.56	-23.24	-11.62	-7.75	22.64	11.54	7.72
100	1.2	42.88	0.29	0.68	-13.07	-6.53	-4.36	12.33	6.44	4.33
90	1.3	46.5	0.40	0.86	-8.74	-4.37	-2.91	7.88	4.25	2.88
134	5.0	47	3.00	6.38	-8.14	-4.07	-2.71	2.18	1.98	1.74
96	1.1	47.1	2.36	5.00	-8.02	-4.01	-2.67	2.68	2.32	1.95
116	1.4	47.38	0.93	1.96	-7.68	-3.84	-2.56	5.14	3.36	2.40
76	2.0	48.13	0.09	0.19	-6.78	-3.39	-2.26	6.74	3.39	2.26
133	4.5	48.18	2.40	4.98	-6.73	-3.36	-2.24	2.21	1.92	1.62
135	1.0	48.75	0.83	1.70	-6.05	-3.02	-2.02	4.29	2.71	1.91
55	5.0	50.63	0.32	0.63	-3.80	-1.90	-1.27	3.55	1.86	1.26
53	2.0	51.3	4.10	7.99	-2.99	-1.50	-1.00	0.60	0.56	0.52
92	1.4	51.41	0.03	0.07	-2.86	-1.43	-0.95	2.86	1.43	0.95
37	1.2	51.98	0.32	0.62	-2.18	-1.09	-0.73	2.03	1.07	0.72
61	5.0	52	0.50	0.96	-2.16	-1.08	-0.72	1.85	1.03	0.70
89	1.3	52.04	1.33	2.56	-2.11	-1.05	-0.70	1.12	0.82	0.62
127	1.3	52.06	4.34	8.34	-2.08	-1.04	-0.69	0.39	0.37	0.35
72	1.4	52.15	0.46	0.89	-1.97	-0.99	-0.66	1.73	0.95	0.65
98	2.0	52.4	0.90	1.72	-1.68	-0.84	-0.56	1.14	0.74	0.53
79	1.1	52.42	2.38	4.55	-1.65	-0.82	-0.55	0.55	0.47	0.40
63	1.0	52.83	0.45	0.85	-1.16	-0.58	-0.39	1.02	0.56	0.38
69	1.1	52.9	5.18	9.79	-1.08	-0.54	-0.36	0.17	0.17	0.16

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
136	1.0	52.91	0.28	0.52	-1.07	-0.54	-0.36	1.02	0.53	0.35
129	1.0	53.03	3.31	6.25	-0.92	-0.46	-0.31	0.23	0.21	0.19
124	1.2	53.32	0.03	0.06	-0.58	-0.29	-0.19	0.58	0.29	0.19
73	1.2	53.82	0.10	0.19	0.03	0.01	0.01	0.02	0.01	0.01
74	2.0	53.88	0.00	0.00	0.09	0.05	0.03	0.09	0.05	0.03
56	1.3	55.04	2.70	4.91	1.48	0.74	0.49	0.44	0.39	0.34
101	1.0	55.1	0.70	1.27	1.56	0.78	0.52	1.19	0.72	0.50
113	2.0	55.14	0.05	0.08	1.60	0.80	0.53	1.60	0.80	0.53
24	1.1	55.19	4.32	7.83	1.67	0.83	0.56	0.32	0.30	0.28
132	1.0	55.98	0.04	0.07	2.61	1.31	0.87	2.61	1.31	0.87
65	1.3	56.42	6.39	11.33	3.13	1.57	1.04	0.41	0.40	0.38
126	1.3	56.88	2.84	4.99	3.69	1.84	1.23	1.04	0.94	0.81
102	1.3	57.27	7.09	12.37	4.16	2.08	1.39	0.49	0.48	0.46
71	1.1	58.24	6.62	11.37	5.32	2.66	1.77	0.67	0.65	0.63
75	1.0	59.17	0.20	0.33	6.43	3.22	2.14	6.26	3.19	2.14
119	1.0	60.84	3.65	6.00	8.43	4.22	2.81	1.88	1.75	1.59
85	1.3	61.48	0.48	0.78	9.19	4.60	3.06	7.98	4.42	3.01
77	1.3	63.2	4.20	6.65	11.25	5.63	3.75	2.20	2.08	1.92
78	1.0	66.62	0.12	0.18	15.35	7.68	5.12	15.20	7.66	5.11
115	2.0	66.9	2.40	3.59	15.68	7.84	5.23	5.16	4.48	3.78
128	1.4	82.04*	1.23	1.49	33.82	16.91	11.27	19.05	13.63	10.13
131	1.2	99.74*	0.06	0.06	55.00	27.50	18.33	54.87	27.48	18.33
				K (1.17 ± 0.06) [g/kg]						
120	1.4	0.05*	0.00	5.22	-34.75	-17.38	-11.58	34.65	17.36	11.58
104	1.4	0.42	0.01	1.63	-23.05	-11.53	-7.68	22.54	11.46	7.67
95	1.4	0.57	0.06	10.53	-18.57	-9.28	-6.19	8.80	6.80	5.26
78	1.0	0.84	0.05	6.29	-10.27	-5.14	-3.42	5.37	3.98	3.01
135	1.0	0.93	0.05	5.72	-7.42	-3.71	-2.47	3.85	2.87	2.17
128	1.4	0.96	0.11	11.94	-6.53	-3.26	-2.18	1.77	1.60	1.41
126	1.3	0.98	0.05	4.99	-5.95	-2.97	-1.98	3.29	2.37	1.77
89	1.3	1.05	0.12	10.96	-3.60	-1.80	-1.20	0.97	0.88	0.77
53	1.4	1.05	0.20	18.98	-3.59	-1.79	-1.20	0.57	0.55	0.52
77	1.3	1.1	0.10	9.09	-2.17	-1.08	-0.72	0.67	0.59	0.50
73	1.2	1.13	0.02	1.83	-1.16	-0.58	-0.39	0.98	0.55	0.38
115	2.0	1.14	0.20	17.54	-0.93	-0.46	-0.31	0.15	0.14	0.13
55	5.0	1.16	0.22	18.83	-0.33	-0.17	-0.11	0.05	0.05	0.04
65	1.3	1.18	0.09	7.50	0.46	0.23	0.15	0.16	0.14	0.11
85	1.3	1.19	0.03	2.52	0.62	0.31	0.21	0.45	0.28	0.20
133	4.5	1.2	0.06	5.02	0.77	0.39	0.26	0.37	0.28	0.22
63	1.0	1.25	0.08	6.00	2.48	1.24	0.83	0.98	0.81	0.65
76	2.0	1.27	0.06	4.84	2.99	1.50	1.00	1.39	1.08	0.84
37	1.2	1.27	0.02	1.88	3.24	1.62	1.08	2.61	1.52	1.05
75	1.0	1.33	0.08	6.33	4.89	2.44	1.63	1.76	1.49	1.23
127	1.3	1.43	0.21	14.78	8.05	4.03	2.68	1.22	1.18	1.12
101	1.0	1.46	0.09	6.16	8.97	4.49	2.99	3.03	2.62	2.19
113	2.0	1.49	0.01	0.67	10.03	5.01	3.34	9.58	4.95	3.32
74	2.0	1.49	0.00	0.02	10.03	5.01	3.34	10.03	5.01	3.34
116	1.4	1.51	0.03	2.25	10.61	5.31	3.54	7.31	4.70	3.34
90	1.3	1.57	0.70	44.59	12.38	6.19	4.13	0.57	0.57	0.57

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
69	1.1	1.75	0.23	13.03	17.95	8.97	5.98	2.52	2.45	2.34
119	1.0	1.79	0.19	10.57	19.25	9.63	6.42	3.24	3.11	2.92
131	1.2	2.1	0.01	0.71	28.71	14.35	9.57	26.05	13.98	9.46
72	1.4	3.94*	0.31	7.93	85.87	42.93	28.62	8.82	8.68	8.47
124	1.2	4.67*	0.03	0.54	108.36	54.18	36.12	85.71	50.53	34.98
96	1.1	7.01*	0.35	5.01	180.71	90.36	60.24	16.57	16.36	16.04
100	1.2	20.4*	1.31	6.43	595.08	297.54	198.36	14.66	14.65	14.63
Mg (11.9 ± 0.46) [g/kg]										
100	1.2	0.09*	0.00	2.22	-50.94	-25.47	-16.98	50.94	25.47	16.98
65	1.3	5.74	0.79	13.75	-26.58	-13.29	-8.86	7.49	6.73	5.86
128	1.4	6.17	0.43	7.01	-24.72	-12.36	-8.24	11.68	9.04	7.00
37	1.2	8.28	0.07	0.82	-15.61	-7.81	-5.20	14.98	7.72	5.18
132	1.0	10	0.06	0.60	-8.20	-4.10	-2.73	7.94	4.06	2.72
85	1.3	10.57	0.30	2.84	-5.74	-2.87	-1.91	3.51	2.41	1.76
53	2.0	10.6	0.85	8.02	-5.61	-2.80	-1.87	1.48	1.34	1.18
124	1.2	12.07	0.04	0.32	0.73	0.37	0.24	0.72	0.36	0.24
76	2.0	12.2	0.16	1.31	1.29	0.65	0.43	1.07	0.61	0.42
113	2.0	12.89	0.04	0.32	4.26	2.13	1.42	4.20	2.12	1.42
98	2.0	13.1	0.50	3.82	5.18	2.59	1.73	2.18	1.76	1.40
115	2.0	13.46	0.37	2.75	6.73	3.36	2.24	3.57	2.63	1.98
74	2.0	13.81	0.00	0.00	8.24	4.12	2.75	8.24	4.12	2.75
126	1.3	13.81	1.37	9.95	8.25	4.13	2.75	1.37	1.32	1.24
133	4.5	13.93	2.10	15.08	8.76	4.38	2.92	0.96	0.94	0.92
127	1.3	14.47	2.26	15.62	11.10	5.55	3.70	1.13	1.12	1.09
131	1.2	14.65	0.24	1.61	11.84	5.92	3.95	8.31	5.28	3.74
78	1.0	17.18	0.40	2.32	22.77	11.38	7.59	11.44	8.63	6.58
69	1.1	20.9	3.20	15.31	38.82	19.41	12.94	2.81	2.78	2.75
136	1.0	24.01	2.70	11.25	52.25	26.13	17.42	4.47	4.42	4.34
119	1.0	49.88*	5.37	10.78	163.81	81.90	54.60	7.06	7.04	7.01
Mn (1.48 ± 0.08) [g/kg]										
120	1.4	0.19*	0.00	1.60	-32.65	-16.33	-10.88	32.55	16.31	10.88
100	1.2	0.21*	0.01	4.29	-32.19	-16.09	-10.73	31.38	15.99	10.70
104	1.4	0.71	0.01	0.81	-19.48	-9.74	-6.49	19.28	9.72	6.49
95	1.4	0.8	0.10	12.50	-17.23	-8.62	-5.74	6.33	5.34	4.39
79	1.1	0.86	0.04	4.97	-15.71	-7.86	-5.24	10.65	6.91	4.93
63	1.0	0.94	0.04	3.72	-13.66	-6.83	-4.55	10.22	6.24	4.37
136	1.0	1	0.05	4.57	-12.12	-6.06	-4.04	7.92	5.24	3.77
96	1.1	1.01	0.05	5.05	-11.91	-5.96	-3.97	7.29	5.00	3.65
90	1.3	1.03	0.15	14.49	-11.28	-5.64	-3.76	2.87	2.63	2.33
76	2.0	1.17	0.02	1.58	-7.94	-3.97	-2.65	7.19	3.87	2.62
133	4.5	1.26	0.25	19.76	-5.45	-2.72	-1.82	0.85	0.82	0.78
78	1.0	1.29	0.03	2.36	-4.93	-2.46	-1.64	3.91	2.30	1.59
119	1.0	1.32	0.08	6.01	-3.93	-1.97	-1.31	1.75	1.38	1.09
73	1.2	1.34	0.01	1.09	-3.57	-1.79	-1.19	3.35	1.76	1.18
37	1.2	1.35	0.04	3.01	-3.24	-1.62	-1.08	2.25	1.44	1.02
127	1.3	1.37	0.05	3.53	-2.86	-1.43	-0.95	1.81	1.22	0.88
36	1.0	1.37	0.02	1.31	-2.74	-1.37	-0.91	2.49	1.33	0.90
65	1.3	1.38	0.13	9.10	-2.41	-1.20	-0.80	0.72	0.64	0.55

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
116	1.4	1.39	0.03	2.24	-2.38	-1.19	-0.79	1.87	1.11	0.77
92	1.4	1.4	0.00	0.22	-1.90	-0.95	-0.63	1.90	0.95	0.63
55	5.0	1.41	0.01	0.53	-1.73	-0.87	-0.58	1.70	0.86	0.58
75	1.0	1.44	0.05	3.26	-1.01	-0.51	-0.34	0.65	0.44	0.31
102	1.3	1.45	0.19	13.34	-0.85	-0.43	-0.28	0.17	0.16	0.15
56	1.3	1.45	0.07	4.84	-0.84	-0.42	-0.28	0.41	0.31	0.24
71	1.1	1.45	0.18	12.41	-0.76	-0.38	-0.25	0.16	0.15	0.14
53	2.0	1.45	0.25	17.24	-0.76	-0.38	-0.25	0.12	0.11	0.11
113	2.0	1.45	0.01	0.62	-0.73	-0.37	-0.24	0.72	0.37	0.24
98	2.0	1.49	0.04	2.68	0.25	0.13	0.08	0.18	0.11	0.08
124	1.2	1.49	0.00	0.13	0.37	0.19	0.12	0.37	0.18	0.12
101	1.0	1.5	0.02	1.33	0.51	0.25	0.17	0.45	0.25	0.17
89	1.3	1.52	0.04	2.63	0.97	0.49	0.32	0.68	0.43	0.31
77	1.3	1.54	0.10	6.49	1.52	0.76	0.51	0.56	0.47	0.39
74	2.0	1.61	0.00	0.00	3.32	1.66	1.11	3.32	1.66	1.11
126	1.3	1.62	0.08	5.01	3.45	1.73	1.15	1.51	1.21	0.95
69	1.1	1.62	0.17	10.49	3.55	1.77	1.18	0.80	0.75	0.68
85	1.3	1.71	0.08	4.62	5.80	2.90	1.93	2.59	2.05	1.61
72	1.4	1.72	0.15	8.58	6.21	3.10	2.07	1.60	1.46	1.29
24	1.1	1.89	0.25	12.94	10.47	5.23	3.49	1.66	1.60	1.52
131	1.2	2.1	0.01	0.32	15.70	7.85	5.23	15.48	7.82	5.22
115	2.0	2.19	0.08	3.78	18.12	9.06	6.04	7.78	6.24	4.95
129	1.0	2.92*	0.19	6.56	36.40	18.20	12.13	7.36	6.94	6.39
128	1.4	3.73*	0.25	6.73	57.10	28.55	19.03	8.86	8.56	8.11
Na (1.5 ± 0.08) [g/kg]										
115	2.0	0.99	0.13	13.13	-12.78	-6.39	-4.26	3.75	3.34	2.89
113	2.0	1.11	0.02	1.99	-9.82	-4.91	-3.27	8.60	4.73	3.22
76	2.0	1.3	0.13	10.05	-5.01	-2.51	-1.67	1.46	1.31	1.13
98	2.0	1.4	0.07	5.00	-2.51	-1.25	-0.84	1.24	0.94	0.72
78	1.0	1.44	0.05	3.65	-1.38	-0.69	-0.46	0.83	0.58	0.42
53	2.0	1.5	0.20	13.33	0.00	0.00	0.00	0.00	0.00	0.00
55	5.0	1.71	0.01	0.40	5.18	2.59	1.73	5.10	2.58	1.72
61	5.0	1.78	0.07	3.81	7.12	3.56	2.37	3.60	2.71	2.06
133	4.5	1.78	0.25	14.01	7.14	3.57	2.38	1.13	1.09	1.03
124	1.2	2.02	0.10	4.96	12.97	6.49	4.32	4.81	4.05	3.32
128	1.4	2.38	0.26	10.92	22.10	11.05	7.37	3.35	3.24	3.08
65	1.3	2.93*	0.37	12.44	35.91	17.95	11.97	3.90	3.84	3.73
132	1.0	3.42*	0.13	3.80	48.17	24.09	16.06	14.14	12.60	10.88
127	1.3	4.45*	1.22	27.33	73.95	36.97	24.65	2.42	2.42	2.41
85	1.3	16.84*	1.04	6.15	384.36	192.18	128.12	14.80	14.76	14.71
Si (261 ± 5.11) [g/kg]										
120	1.4	0.08*	0.00	2.22	-102.15	-51.07	-34.05	102.15	51.07	34.05
136	1.0	98.97*	2.16	2.18	-63.43	-31.72	-21.14	48.47	29.22	20.35
116	1.4	173.82*	3.49	2.00	-34.13	-17.06	-11.38	20.18	14.10	10.36
100	1.2	182.34*	3.33	1.83	-30.80	-15.40	-10.27	18.75	12.90	9.42
75	1.0	209.42	2.41	1.15	-20.19	-10.10	-6.73	14.68	9.13	6.42
53	2.0	213	17.00	7.98	-18.79	-9.40	-6.26	2.79	2.70	2.57
63	1.0	244.5	5.05	2.07	-6.46	-3.23	-2.15	2.92	2.30	1.80

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
73	1.2	246.84	2.49	1.01	-5.54	-2.77	-1.85	3.97	2.49	1.76
65	1.3	248.56	14.23	5.73	-4.87	-2.44	-1.62	0.86	0.82	0.77
126	1.3	248.88	12.44	5.00	-4.75	-2.37	-1.58	0.95	0.90	0.83
98	2.0	252	3.00	1.19	-3.52	-1.76	-1.17	2.28	1.52	1.09
37	1.2	261.23	1.93	0.74	0.09	0.04	0.03	0.07	0.04	0.03
113	2.0	261.45	0.14	0.05	0.18	0.09	0.06	0.18	0.09	0.06
124	1.2	262.31	0.10	0.04	0.51	0.26	0.17	0.51	0.26	0.17
115	2.0	264.6	8.00	3.02	1.41	0.70	0.47	0.43	0.38	0.32
74	2.0	264.64	0.00	0.00	1.43	0.71	0.48	1.43	0.71	0.48
69	1.1	272	34.90	12.83	4.31	2.15	1.44	0.31	0.31	0.31
132	1.0	274.6	0.20	0.07	5.32	2.66	1.77	5.31	2.66	1.77
133	4.5	280.7	9.80	3.49	7.71	3.86	2.57	1.95	1.78	1.58
78	1.0	283.11	1.82	0.64	8.66	4.33	2.89	7.05	4.08	2.81
127	1.3	285.71	32.10	11.24	9.67	4.84	3.22	0.77	0.76	0.75
131	1.2	289.65	0.42	0.15	11.22	5.61	3.74	11.07	5.59	3.73
76	2.0	295.67	0.88	0.30	13.57	6.79	4.52	12.84	6.69	4.49
77	1.3	296	21.00	7.09	13.70	6.85	4.57	1.65	1.62	1.57
119	1.0	314.01	33.09	10.54	20.75	10.38	6.92	1.60	1.58	1.56

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
				Ag [mg/kg]						
37	1.2	2.606	1.32	50.69	-	-	-	-	-	-
126	1.3	4.434	1.44	32.50	-	-	-	-	-	-
72	1.4	75315*	6691.00	8.88	-	-	-	-	-	-
				As (4.62 ± 0.59) [mg/kg]						
124	1.2	1.3	0.10	7.69	-11.31	-5.66	-3.77	10.71	5.58	3.75
132	1.0	1.65	0.30	18.18	-10.12	-5.06	-3.37	7.08	4.51	3.19
72	1.4	1.68	2.80	166.67	-10.02	-5.01	-3.34	1.04	1.03	1.00
120	1.4	2.33	0.19	8.15	-7.80	-3.90	-2.60	6.55	3.71	2.54
116	1.4	3.7	0.70	18.92	-3.13	-1.57	-1.04	1.21	1.01	0.82
65	1.3	4.1	0.60	14.63	-1.77	-0.89	-0.59	0.78	0.62	0.49
126	1.3	4.213	0.33	7.90	-1.39	-0.69	-0.46	0.92	0.60	0.43
56	1.3	4.8	0.30	6.25	0.61	0.31	0.20	0.43	0.27	0.19
61	5.0	5.17	0.17	3.29	1.87	0.94	0.62	1.62	0.90	0.61
55	5.0	5.224	0.16	3.01	2.06	1.03	0.69	1.81	0.99	0.68
125	2.0	5.43	0.39	7.18	2.76	1.38	0.92	1.66	1.15	0.84
75	1.4	5.51	0.50	9.07	3.03	1.52	1.01	1.54	1.15	0.88
85	1.3	5.75	0.86	14.96	3.85	1.93	1.28	1.24	1.09	0.92
74	2.0	6	1.02	17.08	4.70	2.35	1.57	1.29	1.17	1.02
136	1.0	7.637	2.60	33.98	10.28	5.14	3.43	1.16	1.13	1.10
104	1.4	9.877	0.21	2.13	17.91	8.96	5.97	14.57	8.43	5.81
133	4.5	12*	2.40	20.00	25.14	12.57	8.38	3.05	2.99	2.89
113	2.0	18*	1.00	5.56	45.59	22.79	15.20	12.84	11.54	10.04
				Ba (431 ± 27.67) [mg/kg]						
116	1.4	164	29.00	17.68	-19.30	-9.65	-6.43	8.31	6.66	5.27
63	1.0	206	12.00	5.83	-16.26	-8.13	-5.42	12.29	7.46	5.21
76	2.0	350	98.37	28.11	-5.85	-2.93	-1.95	0.82	0.79	0.76
124	1.2	353	6.00	1.70	-5.64	-2.82	-1.88	5.17	2.75	1.86
69	1.1	368	36.00	9.78	-4.55	-2.28	-1.52	1.63	1.39	1.15
85	1.3	383.93	7.29	1.90	-3.40	-1.70	-1.13	3.01	1.64	1.12
126	1.3	391.331	19.95	5.10	-2.87	-1.43	-0.96	1.63	1.16	0.86
71	1.1	394	19.00	4.82	-2.67	-1.34	-0.89	1.57	1.10	0.81
61	5.0	398	45.00	11.31	-2.39	-1.19	-0.80	0.70	0.62	0.54
113	2.0	407	17.00	4.18	-1.73	-0.87	-0.58	1.09	0.74	0.54
56	1.3	433	20.00	4.62	0.14	0.07	0.05	0.08	0.06	0.04
37	1.2	435.458	25.22	5.79	0.32	0.16	0.11	0.15	0.12	0.09
74	2.0	444	16.48	3.71	0.94	0.47	0.31	0.60	0.40	0.29
132	1.0	450.675	9.80	2.17	1.42	0.71	0.47	1.16	0.67	0.46
102	1.3	513.367	74.00	14.41	5.95	2.98	1.98	1.09	1.04	0.97
65	1.3	525	43.00	8.19	6.79	3.40	2.26	2.08	1.84	1.57
127	1.3	588	26.00	4.42	11.35	5.67	3.78	5.33	4.13	3.21
78	1.0	669.44	16.42	2.45	17.23	8.62	5.74	11.10	7.41	5.34
75	1.4	687.45	8.72	1.27	18.54	9.27	6.18	15.68	8.84	6.05
136	1.0	858.88*	32.39	3.77	30.93	15.46	10.31	12.15	10.04	8.13
115	2.0	1475*	40.00	2.71	75.46	37.73	25.15	24.67	21.46	18.11

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
				Bi [mg/kg]						
131	1.2	2.922	0.43	14.68	-	-	-	-	-	-
				Br (0.925 ± 0.15) [mg/kg]						
37	1.2	0.983	0.24	24.52	0.77	0.39	0.26	0.23	0.20	0.18
55	5.0	1.227	0.19	15.32	4.03	2.02	1.34	1.49	1.26	1.03
65	1.3	2.9	0.70	24.14	26.38	13.19	8.79	2.81	2.76	2.69
136	1.0	5.21	0.26	4.99	57.24	28.62	19.08	15.84	14.28	12.47
129	1.0	6.04	1.41	23.34	68.33	34.16	22.78	3.62	3.61	3.58
				C [mg/kg]						
113	2.0	23668	268.00	1.13	-	-	-	-	-	-
				Cd (0.425 ± 0.08) [mg/kg]						
132	1.0	1.15	0.70	60.87	18.75	9.38	6.25	1.03	1.03	1.02
				Ce [mg/kg]						
69	1.1	28.5	3.00	10.53	-	-	-	-	-	-
134	5.0	29.3	4.90	16.72	-	-	-	-	-	-
132	1.0	31.375	6.20	19.76	-	-	-	-	-	-
71	1.1	35	3.00	8.57	-	-	-	-	-	-
55	5.0	35.782	1.18	3.30	-	-	-	-	-	-
61	5.0	39.15	0.48	1.23	-	-	-	-	-	-
65	1.3	79*	8.90	11.27	-	-	-	-	-	-
				Cl [mg/kg]						
120	1.4	8.41	1.12	13.32	-	-	-	-	-	-
132	1.0	33.75	0.20	0.59	-	-	-	-	-	-
75	1.0	115	43.00	37.39	-	-	-	-	-	-
116	1.4	117	22.00	18.80	-	-	-	-	-	-
131	1.2	191.51	5.48	2.86	-	-	-	-	-	-
63	1.0	629*	125.00	19.87	-	-	-	-	-	-
104	1.4	4171.665*	38.93	0.93	-	-	-	-	-	-
				Co (17.3 ± 1.80) [mg/kg]						
124	1.2	5.7	0.70	12.28	-12.87	-6.44	-4.29	10.17	6.00	4.15
127	1.3	10.1	1.30	12.87	-7.99	-4.00	-2.66	4.55	3.24	2.40
132	1.0	12.625	2.10	16.63	-5.19	-2.59	-1.73	2.05	1.69	1.37
63	1.0	13.75	0.85	6.18	-3.94	-1.97	-1.31	2.87	1.78	1.25
126	1.3	14.412	2.22	15.38	-3.21	-1.60	-1.07	1.21	1.01	0.83
65	1.3	16.7	2.36	14.13	-0.67	-0.33	-0.22	0.24	0.20	0.17
98	2.0	16.9	0.60	3.55	-0.44	-0.22	-0.15	0.37	0.21	0.14
55	5.0	17.506	0.23	1.30	0.23	0.11	0.08	0.22	0.11	0.08
61	5.0	17.92	0.38	2.12	0.69	0.34	0.23	0.63	0.34	0.23
125	2.0	18.26	1.41	7.72	1.07	0.53	0.36	0.57	0.42	0.31
101	1.0	22	3.00	13.64	5.22	2.61	1.74	1.50	1.34	1.16
85	1.3	22.76	0.36	1.58	6.06	3.03	2.02	5.63	2.97	2.00
74	2.0	23	2.80	12.17	6.33	3.16	2.11	1.94	1.71	1.46
79	1.1	27.866	1.33	4.75	11.73	5.86	3.91	6.59	4.72	3.51

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
89	1.3	160.748*	7.56	4.70	159.21	79.61	53.07	18.83	18.45	17.86
					Cr (15 ± 1.60) [mg/kg]					
98	2.0	8.28	0.52	6.28	-8.42	-4.21	-2.81	7.05	4.00	2.74
134	5.0	10.9	1.50	13.76	-5.14	-2.57	-1.71	2.41	1.87	1.45
61	5.0	12.4	1.20	9.68	-3.26	-1.63	-1.09	1.80	1.30	0.97
75	1.4	13.73	2.40	17.48	-1.59	-0.80	-0.53	0.50	0.44	0.37
55	5.0	13.976	4.10	29.34	-1.28	-0.64	-0.43	0.25	0.23	0.22
126	1.3	14.412	2.22	15.38	-0.74	-0.37	-0.25	0.25	0.22	0.18
125	2.0	16.1	0.93	5.78	1.38	0.69	0.46	0.90	0.60	0.43
104	1.4	19.355	1.39	7.17	5.46	2.73	1.82	2.72	2.06	1.57
101	1.0	21	7.00	33.33	7.52	3.76	2.51	0.85	0.84	0.81
65	1.3	22.4	2.48	11.07	9.27	4.64	3.09	2.84	2.51	2.15
127	1.3	32.9	3.30	10.03	22.43	11.21	7.48	5.27	4.88	4.39
129	1.0	35.28	11.16	31.63	25.41	12.70	8.47	1.81	1.80	1.78
63	1.0	37	4.00	10.81	27.56	13.78	9.19	5.39	5.11	4.72
71	1.1	76*	10.00	13.16	76.43	38.21	25.48	6.08	6.02	5.93
78	1.0	85.64*	0.83	0.97	88.50	44.25	29.50	61.35	39.26	27.87
100	1.2	102*	8.00	7.84	109.00	54.50	36.33	10.82	10.66	10.42
136	1.0	114.768*	14.70	12.81	125.00	62.50	41.67	6.78	6.75	6.70
69	1.1	151*	56.00	37.09	170.39	85.20	56.80	2.43	2.43	2.43
124	1.2	196.2*	2.00	1.02	227.02	113.51	75.67	84.15	70.81	58.08
96	1.1	314*	16.00	5.10	374.61	187.31	124.87	18.66	18.60	18.48
119	1.0	18436.5*	1108.64	6.01	23079	11539	7693.33	16.62	16.62	16.62
					Cs [mg/kg]					
55	5.0	2.236	0.17	7.42	-	-	-	-	-	-
61	5.0	2.46	0.14	5.69	-	-	-	-	-	-
134	5.0	3	0.10	3.33	-	-	-	-	-	-
					Cu (54.8 ± 4.80) [mg/kg]					
96	1.1	9	0.50	5.56	-19.09	-9.54	-6.36	18.69	9.49	6.35
124	1.2	17.5	0.20	1.14	-15.55	-7.77	-5.18	15.49	7.77	5.18
90	1.3	20	4.00	20.00	-14.50	-7.25	-4.83	7.46	5.57	4.23
63	1.0	21.2	2.40	11.32	-14.00	-7.00	-4.67	9.90	6.26	4.43
79	1.1	30.064	1.93	6.43	-10.31	-5.15	-3.44	8.03	4.78	3.32
104	1.4	32.864	0.49	1.49	-9.14	-4.57	-3.05	8.96	4.55	3.04
73	1.2	33.328	1.66	4.99	-8.95	-4.47	-2.98	7.36	4.23	2.91
95	1.4	35	4.00	11.43	-8.25	-4.13	-2.75	4.24	3.17	2.40
55	1.3	37.404	0.53	1.41	-7.25	-3.63	-2.42	7.08	3.60	2.41
65	1.3	39.8	3.26	8.19	-6.25	-3.13	-2.08	3.71	2.59	1.90
74	2.0	42	10.01	23.83	-5.33	-2.67	-1.78	1.24	1.15	1.04
116	1.4	49	1.20	2.45	-2.42	-1.21	-0.81	2.16	1.17	0.79
78	1.0	49.14	1.50	3.05	-2.36	-1.18	-0.79	2.00	1.13	0.77
92	1.4	49.7	0.34	0.68	-2.13	-1.06	-0.71	2.10	1.06	0.71
98	2.0	51.1	1.80	3.52	-1.54	-0.77	-0.51	1.23	0.72	0.50
135	1.0	51.934	2.65	5.10	-1.19	-0.60	-0.40	0.80	0.52	0.37
56	1.3	52	2.50	4.81	-1.17	-0.58	-0.39	0.81	0.52	0.37
126	1.3	52.104	2.22	4.25	-1.12	-0.56	-0.37	0.83	0.51	0.36
102	1.3	52.126	10.00	19.18	-1.11	-0.56	-0.37	0.26	0.24	0.22

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
37	1.2	53.068	1.55	2.93	-0.72	-0.36	-0.24	0.61	0.34	0.24
132	1.0	54.125	0.90	1.66	-0.28	-0.14	-0.09	0.26	0.14	0.09
24	1.1	55	4.00	7.27	0.08	0.04	0.03	0.04	0.03	0.02
85	1.3	55.36	0.39	0.70	0.23	0.12	0.08	0.23	0.12	0.08
113	2.0	60	1.00	1.67	2.17	1.08	0.72	2.00	1.06	0.72
72	1.4	60	9.00	15.00	2.17	1.08	0.72	0.56	0.51	0.45
127	1.3	60.9	4.00	6.57	2.54	1.27	0.85	1.31	0.98	0.74
76	2.0	61	4.51	7.39	2.58	1.29	0.86	1.21	0.94	0.73
36	1.0	65	1.00	1.54	4.25	2.13	1.42	3.92	2.08	1.40
101	1.0	70	20.00	28.57	6.34	3.17	2.11	0.75	0.74	0.72
89	1.3	70.476	2.26	3.21	6.53	3.27	2.18	4.76	2.96	2.08
133	4.5	71.4	5.00	7.00	6.92	3.46	2.31	2.99	2.40	1.89
129	1.0	72.75	3.32	4.56	7.48	3.74	2.49	4.38	3.08	2.26
75	1.4	77.15	0.80	1.04	9.32	4.66	3.11	8.84	4.59	3.09
69	1.1	84	13.40	15.95	12.17	6.08	4.06	2.14	2.05	1.92
77	1.3	102	7.80	7.65	19.67	9.84	6.56	5.78	5.15	4.45
131	1.2	123.59*	1.56	1.26	28.67	14.34	9.56	24.04	13.63	9.34
128	1.4	137*	8.12	5.93	34.26	17.13	11.42	9.71	8.72	7.58
				Eu [mg/kg]						
55	5.0	1.157	0.12	10.63	-	-	-	-	-	-
61	5.0	1.341	0.03	2.39	-	-	-	-	-	-
134	5.0	1.5	0.10	6.67	-	-	-	-	-	-
131	1.2	760.12*	14.06	1.85	-	-	-	-	-	-
				Ga (25 ± 2.46) [mg/kg]						
95	1.4	9	2.00	22.22	-12.99	-6.49	-4.33	6.81	5.04	3.81
55	5.0	11.741	1.13	9.67	-10.76	-5.38	-3.59	7.92	4.89	3.43
36	1.0	13	1.00	7.69	-9.74	-4.87	-3.25	7.56	4.51	3.13
74	2.0	14	2.18	15.57	-8.93	-4.46	-2.98	4.39	3.34	2.56
65	1.3	14.2	1.60	11.27	-8.77	-4.38	-2.92	5.35	3.68	2.68
116	1.4	14.2	0.30	2.11	-8.77	-4.38	-2.92	8.52	4.35	2.91
78	1.0	16.28	0.43	2.64	-7.08	-3.54	-2.36	6.68	3.49	2.34
75	1.4	17.63	0.70	3.97	-5.98	-2.99	-1.99	5.20	2.88	1.96
126	1.3	17.737	1.11	6.25	-5.90	-2.95	-1.97	4.38	2.69	1.88
72	1.4	18	2.00	11.11	-5.68	-2.84	-1.89	2.98	2.21	1.67
125	2.0	18.069	1.03	5.70	-5.63	-2.81	-1.88	4.32	2.60	1.81
37	1.2	18.443	0.42	2.27	-5.32	-2.66	-1.77	5.04	2.62	1.76
56	1.3	20	1.00	5.00	-4.06	-2.03	-1.35	3.15	1.88	1.31
113	2.0	20	1.00	5.00	-4.06	-2.03	-1.35	3.15	1.88	1.31
90	1.3	22	6.00	27.27	-2.44	-1.22	-0.81	0.49	0.46	0.43
132	1.0	22.3	0.50	2.24	-2.19	-1.10	-0.73	2.03	1.07	0.72
69	1.1	24	5.60	23.33	-0.81	-0.41	-0.27	0.17	0.16	0.15
131	1.2	31.54	0.61	1.94	5.31	2.65	1.77	4.75	2.58	1.75
77	1.3	32*	3.10	9.69	5.68	2.84	1.89	2.10	1.77	1.45
89	1.3	37.279*	1.27	3.41	9.97	4.98	3.32	6.94	4.43	3.14
128	1.4	41*	5.92	14.44	12.99	6.49	4.33	2.65	2.50	2.29
104	1.4	49.885*	0.58	1.16	20.20	10.10	6.73	18.28	9.83	6.65
136	1.0	64.43*	3.64	5.65	32.01	16.00	10.67	10.26	8.97	7.60

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
				Hf [mg/kg]						
126	1.3	0.776*	0.11	14.30	-	-	-	-	-	-
134	5.0	2.5	0.20	8.00	-	-	-	-	-	-
55	5.0	2.806	0.21	7.45	-	-	-	-	-	-
132	1.0	2.925	0.30	10.26	-	-	-	-	-	-
61	5.0	3.12	0.13	4.17	-	-	-	-	-	-
75	1.4	43.99*	0.80	1.82	-	-	-	-	-	-
				Hg (1.77 ± 0.26) [mg/kg]						
37	1.2	0.595	0.09	14.45	-9.04	-4.52	-3.01	7.54	4.29	2.94
132	1.0	2.725	0.30	11.01	7.35	3.68	2.45	2.92	2.41	1.94
126	1.3	3.991	0.33	8.34	17.10	8.55	5.70	6.21	5.26	4.33
131	1.2	5.489	0.47	8.56	28.63	14.31	9.54	7.63	6.93	6.09
				La [mg/kg]						
69	1.1	8.97	1.30	14.49	-	-	-	-	-	-
134	5.0	10.9	2.10	19.27	-	-	-	-	-	-
71	1.1	15	2.00	13.33	-	-	-	-	-	-
75	1.4	16.43	7.41	45.10	-	-	-	-	-	-
55	5.0	16.822	0.27	1.61	-	-	-	-	-	-
61	5.0	19.46	0.12	0.62	-	-	-	-	-	-
125	2.0	22.19	2.10	9.46	-	-	-	-	-	-
98	2.0	22.6	2.50	11.06	-	-	-	-	-	-
77	1.3	61.8*	5.70	9.22	-	-	-	-	-	-
				Lu [mg/kg]						
55	5.0	0.388	0.05	12.11	-	-	-	-	-	-
61	5.0	0.486	0.03	5.14	-	-	-	-	-	-
				Mo (3.84 ± 0.50) [mg/kg]						
63	1.0	0.9	0.20	22.22	-11.72	-5.86	-3.91	9.16	5.44	3.78
132	1.0	1.225	0.30	24.49	-10.43	-5.21	-3.48	6.69	4.47	3.23
				Nb [mg/kg]						
65	1.3	2.2*	0.30	13.64	-	-	-	-	-	-
132	1.0	3.625	0.50	13.79	-	-	-	-	-	-
126	1.3	3.88	0.44	11.42	-	-	-	-	-	-
74	2.0	4	3.99	99.75	-	-	-	-	-	-
124	1.2	4.1	0.30	7.32	-	-	-	-	-	-
95	1.4	4.3	0.50	11.63	-	-	-	-	-	-
63	1.0	4.6	0.80	17.39	-	-	-	-	-	-
69	1.1	4.7	1.00	21.28	-	-	-	-	-	-
98	2.0	4.88	0.13	2.66	-	-	-	-	-	-
96	1.1	5	0.30	6.00	-	-	-	-	-	-
71	1.1	6*	1.30	21.67	-	-	-	-	-	-
131	1.2	7.68*	0.29	3.78	-	-	-	-	-	-
113	2.0	10*	1.00	10.00	-	-	-	-	-	-
36	1.0	14*	1.00	7.14	-	-	-	-	-	-

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
				Nd [mg/kg]						
134	5.0	10.5	1.40	13.33	-	-	-	-	-	-
69	1.1	13	1.80	13.85	-	-	-	-	-	-
71	1.1	20	6.00	30.00	-	-	-	-	-	-
				Ni (8.94 ± 1.03) [mg/kg]						
37	1.2	5.232	1.12	21.35	-7.21	-3.61	-2.40	3.02	2.44	1.95
98	2.0	5.36	0.34	6.34	-6.96	-3.48	-2.32	5.81	3.30	2.27
65	1.3	7.7	0.60	7.79	-2.41	-1.21	-0.80	1.57	1.04	0.75
78	1.0	10.01	1.00	9.99	2.08	1.04	0.69	0.95	0.75	0.58
126	1.3	10.088	0.55	5.49	2.23	1.12	0.74	1.52	0.98	0.70
75	1.4	11.32	0.70	6.18	4.63	2.31	1.54	2.74	1.91	1.40
132	1.0	24.425*	0.70	2.87	30.11	15.06	10.04	17.83	12.45	9.14
79	1.1	68.32*	3.94	5.77	115.47	57.74	38.49	14.94	14.58	14.03
104	1.4	711.234*	0.35	0.05	1365	682.85	455.24	1130.03	646.64	444.02
				P (123 ± 9.54) [mg/kg]						
37	1.2	69.448	0.63	0.91	-11.23	-5.62	-3.74	11.13	5.60	3.74
115	2.0	70.5	6.60	9.36	-11.01	-5.50	-3.67	6.45	4.53	3.33
53	1.4	78	15.00	19.23	-9.44	-4.72	-3.15	2.86	2.53	2.17
76	2.0	96.5	15.81	16.38	-5.56	-2.78	-1.85	1.60	1.44	1.24
113	2.0	112	2.00	1.79	-2.31	-1.15	-0.77	2.13	1.13	0.76
74	2.0	113	0.00	0.00	-2.10	-1.05	-0.70	2.10	1.05	0.70
126	1.3	156.089	7.87	5.04	6.94	3.47	2.31	3.60	2.68	2.03
132	1.0	217.15*	3.00	1.38	19.74	9.87	6.58	16.71	9.42	6.44
63	1.0	289*	25.00	8.65	34.81	17.41	11.60	6.52	6.20	5.76
78	1.0	388.11*	5.50	1.42	55.60	27.80	18.53	36.42	24.08	17.30
100	1.2	447*	12.00	2.68	67.95	33.97	22.65	25.09	21.14	17.35
77	1.3	1200*	100.00	8.33	225.86	112.93	75.29	10.76	10.72	10.66
124	1.2	1551.3*	13.00	0.84	299.53	149.77	99.84	103.15	88.59	73.89
131	1.2	2187.19*	10.31	0.47	432.89	216.44	144.30	181.69	146.96	117.05
75	1.0	3299*	211.00	6.40	666.05	333.02	222.02	15.05	15.04	15.02
				Pb (18.5 ± 1.91) [mg/kg]						
124	1.2	8.4	0.20	2.38	-10.59	-5.29	-3.53	10.36	5.27	3.52
63	1.0	10.9	1.30	11.93	-7.97	-3.98	-2.66	4.71	3.29	2.42
65	1.3	11.3	1.30	11.50	-7.55	-3.77	-2.52	4.47	3.12	2.29
95	1.4	14	1.00	7.14	-4.72	-2.36	-1.57	3.26	2.09	1.48
55	1.3	14.113	0.37	2.59	-4.60	-2.30	-1.53	4.29	2.26	1.52
98	2.0	14.3	0.50	3.50	-4.40	-2.20	-1.47	3.90	2.13	1.45
56	1.3	14.4	0.70	4.86	-4.30	-2.15	-1.43	3.47	2.02	1.39
37	1.2	14.843	0.06	0.38	-3.83	-1.92	-1.28	3.83	1.92	1.28
101	1.0	15	3.00	20.00	-3.67	-1.83	-1.22	1.11	0.98	0.84
79	1.1	15.36	4.39	28.58	-3.29	-1.65	-1.10	0.70	0.66	0.60
78	1.0	15.77	0.27	1.71	-2.86	-1.43	-0.95	2.75	1.42	0.95
85	1.3	15.91	0.58	3.65	-2.72	-1.36	-0.91	2.32	1.30	0.89
126	1.3	16.075	0.78	4.83	-2.54	-1.27	-0.85	1.97	1.18	0.82
125	2.0	16.08	0.75	4.66	-2.54	-1.27	-0.85	1.99	1.18	0.82
89	1.3	17.633	1.00	5.65	-0.91	-0.45	-0.30	0.63	0.40	0.29

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
102	1.3	17.716	3.00	16.93	-0.82	-0.41	-0.27	0.25	0.22	0.19
132	1.0	18.275	0.50	2.74	-0.24	-0.12	-0.08	0.21	0.11	0.08
116	1.4	19	1.50	7.89	0.52	0.26	0.17	0.28	0.21	0.15
100	1.2	20	30.00	150.0	1.57	0.79	0.52	0.05	0.05	0.05
96	1.1	25	1.30	5.20	6.81	3.41	2.27	4.03	2.82	2.07
69	1.1	27.8*	6.20	22.30	9.75	4.88	3.25	1.48	1.43	1.36
75	1.4	28.66*	0.80	2.79	10.65	5.33	3.55	8.16	4.91	3.42
127	1.3	30.7*	5.90	19.22	12.79	6.40	4.26	2.04	1.97	1.86
136	1.0	34.56*	1.04	3.01	16.84	8.42	5.61	11.38	7.39	5.27
24	1.1	49*	4.00	8.16	31.98	15.99	10.66	7.42	6.88	6.20
131	1.2	73.667*	0.49	0.66	57.84	28.92	19.28	51.51	28.02	19.01
128	1.4	145*	10.32	7.12	132.63	66.31	44.21	12.21	12.05	11.81
				Rb (16 ± 1.69) [mg/kg]						
120	1.4	1.47*	0.14	9.52	-17.23	-8.62	-5.74	17.00	8.59	5.74
95	1.4	10	2.00	20.00	-7.12	-3.56	-2.37	2.76	2.29	1.86
136	1.0	10.95	0.20	1.83	-5.99	-2.99	-2.00	5.83	2.97	1.99
71	1.1	12.4	1.90	15.32	-4.27	-2.13	-1.42	1.73	1.42	1.14
79	1.1	12.775	4.68	36.61	-3.82	-1.91	-1.27	0.68	0.65	0.61
56	1.3	13.8	0.50	3.62	-2.61	-1.30	-0.87	2.24	1.25	0.85
76	2.0	14	2.25	16.07	-2.37	-1.19	-0.79	0.83	0.71	0.59
55	1.3	14.309	0.18	1.25	-2.01	-1.00	-0.67	1.96	1.00	0.67
37	1.2	14.33	0.06	0.40	-1.98	-0.99	-0.66	1.98	0.99	0.66
36	1.0	15	1.00	6.67	-1.19	-0.59	-0.40	0.76	0.51	0.37
125	2.0	15.37	0.65	4.23	-0.75	-0.37	-0.25	0.59	0.35	0.24
126	1.3	15.409	0.78	5.04	-0.70	-0.35	-0.23	0.52	0.32	0.22
132	1.0	15.55	0.20	1.29	-0.53	-0.27	-0.18	0.52	0.27	0.18
98	2.0	15.6	0.30	1.92	-0.47	-0.24	-0.16	0.45	0.23	0.16
85	1.3	15.66	0.20	1.28	-0.40	-0.20	-0.13	0.39	0.20	0.13
65	1.3	15.7	1.90	12.10	-0.36	-0.18	-0.12	0.14	0.12	0.09
96	1.1	16	0.80	5.00	0.00	0.00	0.00	0.00	0.00	0.00
101	1.0	16	1.00	6.25	0.00	0.00	0.00	0.00	0.00	0.00
74	2.0	16	12.41	77.56	0.00	0.00	0.00	0.00	0.00	0.00
134	5.0	16.3	1.20	7.36	0.36	0.18	0.12	0.20	0.14	0.11
63	1.0	17.2	2.50	14.53	1.42	0.71	0.47	0.45	0.40	0.34
89	1.3	18.184	0.66	3.64	2.59	1.30	0.86	2.04	1.21	0.84
61	5.0	18.2	2.50	13.74	2.61	1.30	0.87	0.83	0.73	0.62
69	1.1	19.1	2.30	12.04	3.68	1.84	1.23	1.27	1.09	0.91
128	1.4	20	8.59	42.95	4.74	2.37	1.58	0.46	0.46	0.45
78	1.0	20.74	0.33	1.59	5.62	2.81	1.87	5.24	2.76	1.86
113	2.0	23	1.00	4.35	8.30	4.15	2.77	5.35	3.57	2.57
90	1.3	24	1.50	6.25	9.49	4.74	3.16	4.65	3.54	2.72
24	1.1	24	3.00	12.50	9.49	4.74	3.16	2.57	2.32	2.04
116	1.4	27.8*	0.01	0.04	14.00	7.00	4.67	13.99	7.00	4.67
72	1.4	31*	2.00	6.45	17.79	8.90	5.93	6.91	5.73	4.65
77	1.3	37.8*	1.90	5.03	25.86	12.93	8.62	10.49	8.58	6.89
131	1.2	40.2*	0.57	1.42	28.70	14.35	9.57	23.75	13.59	9.33
75	1.4	42.38*	0.50	1.18	31.29	15.64	10.43	26.91	15.00	10.23
133	4.5	47.1*	7.00	14.86	36.89	18.44	12.30	4.41	4.32	4.18
104	1.4	50.594*	0.51	1.01	41.03	20.51	13.68	35.13	19.64	13.41

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
				S (83.5 ± 6.86) [mg/kg]						
126	1.3	3.215	0.17	5.16	-23.40	-11.70	-7.80	23.37	11.70	7.80
132	1.0	60.75	0.70	1.15	-6.63	-3.31	-2.21	6.50	3.30	2.20
76	2.0	95.33	12.48	13.09	3.45	1.72	1.15	0.91	0.83	0.73
63	1.0	145	13.00	8.97	17.92	8.96	5.97	4.57	4.18	3.71
69	1.1	169	71.00	42.01	24.92	12.46	8.31	1.20	1.20	1.19
127	1.3	205	71.40	34.83	35.41	17.70	11.80	1.70	1.69	1.68
131	1.2	218.18	9.62	4.41	39.25	19.62	13.08	13.18	11.39	9.56
113	2.0	327	4.00	1.22	70.96	35.48	23.65	46.20	30.65	22.05
75	1.0	3140*	1312.00	41.78	890.74	445.37	296.91	2.33	2.33	2.33
				Sb (0.6 ± 0.10) [mg/kg]						
61	5.0	0.298	0.02	5.70	-5.83	-2.91	-1.94	5.54	2.88	1.93
				Sc [mg/kg]						
74	2.0	16	0.00	0.01	-	-	-	-	-	-
55	5.0	16.407	0.03	0.20	-	-	-	-	-	-
125	2.0	16.73	1.01	6.04	-	-	-	-	-	-
63	1.0	16.8	1.20	7.14	-	-	-	-	-	-
61	5.0	17.3	0.10	0.58	-	-	-	-	-	-
98	2.0	18.1	0.90	4.97	-	-	-	-	-	-
134	5.0	19.8*	1.10	5.56	-	-	-	-	-	-
65	1.3	46.5*	4.56	9.81	-	-	-	-	-	-
129	1.0	375.08*	101.49	27.06	-	-	-	-	-	-
				Sm [mg/kg]						
134	5.0	0.8	0.10	12.50	-	-	-	-	-	-
55	5.0	4.108	0.05	1.22	-	-	-	-	-	-
61	5.0	5.05	0.03	0.65	-	-	-	-	-	-
				Sn (11 ± 1.23) [mg/kg]						
65	1.3	3.4	0.30	8.82	-12.39	-6.20	-4.13	11.13	6.02	4.08
126	1.3	12.638	0.78	6.14	2.67	1.34	0.89	1.66	1.13	0.82
				Sr (150 ± 11.29) [mg/kg]						
120	1.4	18.03*	0.48	2.66	-23.38	-11.69	-7.79	23.30	11.68	7.79
104	1.4	29.851*	0.36	1.20	-21.29	-10.64	-7.10	21.24	10.64	7.09
129	1.0	95.31	6.70	7.03	-9.69	-4.84	-3.23	6.24	4.17	3.00
53	1.4	100	25.00	25.00	-8.86	-4.43	-2.95	1.95	1.82	1.66
76	2.0	100	2.25	2.25	-8.86	-4.43	-2.95	8.23	4.34	2.93
73	1.2	101.156	1.38	1.36	-8.65	-4.33	-2.88	8.41	4.30	2.88
95	1.4	104	7.00	6.73	-8.15	-4.08	-2.72	5.12	3.46	2.51
116	1.4	104	1.50	1.44	-8.15	-4.08	-2.72	7.88	4.04	2.71
135	1.0	104.613	6.91	6.61	-8.04	-4.02	-2.68	5.09	3.43	2.48
124	1.2	105.2	0.20	0.19	-7.94	-3.97	-2.65	7.93	3.97	2.65
100	1.2	111	5.00	4.50	-6.91	-3.45	-2.30	5.17	3.16	2.21
115	2.0	119.8	4.00	3.34	-5.35	-2.68	-1.78	4.37	2.52	1.74
55	1.3	122.43	0.25	0.20	-4.88	-2.44	-1.63	4.88	2.44	1.63
90	1.3	130	3.00	2.31	-3.54	-1.77	-1.18	3.13	1.71	1.16

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
65	1.3	131.4	15.60	11.87	-3.30	-1.65	-1.10	1.12	0.97	0.81
74	2.0	140	9.81	7.01	-1.77	-0.89	-0.59	0.88	0.67	0.51
63	1.0	140	6.00	4.29	-1.77	-0.89	-0.59	1.21	0.78	0.56
125	2.0	140.3	11.40	8.13	-1.72	-0.86	-0.57	0.76	0.60	0.48
133	4.5	141	9.00	6.38	-1.59	-0.80	-0.53	0.85	0.62	0.47
37	1.2	142.077	1.35	0.95	-1.40	-0.70	-0.47	1.37	0.70	0.47
85	1.3	142.42	1.15	0.81	-1.34	-0.67	-0.45	1.32	0.67	0.45
56	1.3	143	7.00	4.90	-1.24	-0.62	-0.41	0.78	0.53	0.38
78	1.0	144.78	0.75	0.52	-0.92	-0.46	-0.31	0.92	0.46	0.31
36	1.0	145	1.00	0.69	-0.89	-0.44	-0.30	0.87	0.44	0.29
98	2.0	145	2.00	1.38	-0.89	-0.44	-0.30	0.84	0.44	0.29
127	1.3	146	23.30	15.96	-0.71	-0.35	-0.24	0.17	0.15	0.14
126	1.3	148.551	7.76	5.22	-0.26	-0.13	-0.09	0.15	0.11	0.08
96	1.1	150	7.50	5.00	0.00	0.00	0.00	0.00	0.00	0.00
71	1.1	152	16.00	10.53	0.35	0.18	0.12	0.12	0.10	0.09
69	1.1	153	15.10	9.87	0.53	0.27	0.18	0.19	0.16	0.13
89	1.3	153.061	3.98	2.60	0.54	0.27	0.18	0.44	0.26	0.18
102	1.3	157.411	21.00	13.34	1.31	0.66	0.44	0.34	0.31	0.27
101	1.0	159	2.00	1.26	1.59	0.80	0.53	1.50	0.79	0.53
77	1.3	163	7.70	4.72	2.30	1.15	0.77	1.36	0.95	0.70
24	1.1	164	16.00	9.76	2.48	1.24	0.83	0.83	0.71	0.60
79	1.1	166.567	13.94	8.37	2.94	1.47	0.98	1.10	0.92	0.76
72	1.4	173	12.00	6.94	4.08	2.04	1.36	1.73	1.40	1.11
113	2.0	180	1.00	0.56	5.32	2.66	1.77	5.23	2.65	1.77
75	1.4	253.9*	1.00	0.39	18.41	9.20	6.14	18.13	9.17	6.13
136	1.0	266.64*	3.18	1.19	20.67	10.33	6.89	18.00	9.95	6.77
128	1.4	298*	2.16	0.72	26.22	13.11	8.74	24.49	12.88	8.67
131	1.2	300.95*	1.21	0.40	26.75	13.37	8.92	26.15	13.30	8.89
					Ta [mg/kg]					
61	5.0	0.293	0.04	13.99	-	-	-	-	-	-
65	1.3	0.53	0.05	9.43	-	-	-	-	-	-
126	1.3	7.982*	1.11	13.89	-	-	-	-	-	-
					Tb [mg/kg]					
61	5.0	0.722	0.08	10.80	-	-	-	-	-	-
					Th [mg/kg]					
134	5.0	2.6	0.30	11.54	-	-	-	-	-	-
85	1.3	3.4	0.30	8.82	-	-	-	-	-	-
75	1.4	3.91	0.50	12.79	-	-	-	-	-	-
37	1.2	4.403	0.17	3.84	-	-	-	-	-	-
55	5.0	5.34	0.20	3.80	-	-	-	-	-	-
61	5.0	5.525	0.09	1.63	-	-	-	-	-	-
65	1.3	5.9	0.75	12.71	-	-	-	-	-	-
125	2.0	5.99	0.32	5.34	-	-	-	-	-	-
126	1.3	6.319	0.67	10.52	-	-	-	-	-	-
98	2.0	6.57	0.40	6.09	-	-	-	-	-	-
132	1.0	6.875	0.40	5.82	-	-	-	-	-	-
124	1.2	7.4	0.20	2.70	-	-	-	-	-	-

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
136	1.0	8.33	0.43	5.16	-	-	-	-	-	-
74	2.0	9	2.04	22.67	-	-	-	-	-	-
78	1.0	9.91	0.36	3.63	-	-	-	-	-	-
77	1.3	11.2	1.03	9.20	-	-	-	-	-	-
				Ti [mg/kg]						
120	1.4	452.96*	6.93	1.53	-	-	-	-	-	-
96	1.1	2240	112.00	5.00	-	-	-	-	-	-
128	1.4	2321	196.43	8.46	-	-	-	-	-	-
95	1.4	2400	100.00	4.17	-	-	-	-	-	-
104	1.4	2481.942	17.80	0.72	-	-	-	-	-	-
79	1.1	3052.819	924.48	30.28	-	-	-	-	-	-
129	1.0	3484.01	157.98	4.53	-	-	-	-	-	-
90	1.3	3500	100.00	2.86	-	-	-	-	-	-
55	5.0	3634.867	460.42	12.67	-	-	-	-	-	-
116	1.4	3768	103.00	2.73	-	-	-	-	-	-
76	2.0	3800	57.10	1.50	-	-	-	-	-	-
89	1.3	3829.932	103.02	2.69	-	-	-	-	-	-
133	4.5	3991	120.00	3.01	-	-	-	-	-	-
135	1.0	4091.333	79.45	1.94	-	-	-	-	-	-
65	1.3	4241	345.00	8.13	-	-	-	-	-	-
74	2.0	4334	0.01	0.00	-	-	-	-	-	-
98	2.0	4410	130.00	2.95	-	-	-	-	-	-
72	1.4	4460	78.00	1.75	-	-	-	-	-	-
63	1.0	4481	110.00	2.45	-	-	-	-	-	-
77	1.3	4500	300.00	6.67	-	-	-	-	-	-
113	2.0	4550	32.00	0.70	-	-	-	-	-	-
73	1.2	4630.418	67.15	1.45	-	-	-	-	-	-
36	1.0	4653	91.00	1.96	-	-	-	-	-	-
37	1.2	4657.301	87.23	1.87	-	-	-	-	-	-
127	1.3	4729.4	432.70	9.15	-	-	-	-	-	-
69	1.1	4880	625.00	12.81	-	-	-	-	-	-
71	1.1	4880	680.00	13.93	-	-	-	-	-	-
102	1.3	4888.841	603.00	12.33	-	-	-	-	-	-
85	1.3	4963	107.00	2.16	-	-	-	-	-	-
119	1.0	5019.87	301.42	6.00	-	-	-	-	-	-
115	2.0	5060	150.00	2.96	-	-	-	-	-	-
136	1.0	5129.125	80.50	1.57	-	-	-	-	-	-
101	1.0	5160	90.00	1.74	-	-	-	-	-	-
75	1.0	5297	50.00	0.94	-	-	-	-	-	-
24	1.1	5330	656.00	12.31	-	-	-	-	-	-
124	1.2	5360.6	7.00	0.13	-	-	-	-	-	-
100	1.2	5632	516.00	9.16	-	-	-	-	-	-
126	1.3	5662.664	282.69	4.99	-	-	-	-	-	-
78	1.0	6038.89	28.10	0.47	-	-	-	-	-	-
131	1.2	6768.89	11.44	0.17	-	-	-	-	-	-
				U [mg/kg]						
85	1.3	0.6	0.20	33.33	-	-	-	-	-	-
55	5.0	1.007	0.22	21.95	-	-	-	-	-	-

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
61	5.0	1.33	0.14	10.53	-	-	-	-	-	-
134	5.0	1.4	0.50	35.71	-	-	-	-	-	-
125	2.0	2.36	0.27	11.44	-	-	-	-	-	-
77	1.3	2.4	0.02	0.83	-	-	-	-	-	-
75	1.4	36.07*	1.00	2.77	-	-	-	-	-	-
					V [mg/kg]					
120	1.4	29.12	1.54	5.29	-	-	-	-	-	-
75	1.4	86.17	3.21	3.73	-	-	-	-	-	-
116	1.4	89.4	4.20	4.70	-	-	-	-	-	-
124	1.2	92	1.50	1.63	-	-	-	-	-	-
101	1.0	110	10.00	9.09	-	-	-	-	-	-
72	1.4	116	6.00	5.17	-	-	-	-	-	-
65	1.3	118	12.00	10.17	-	-	-	-	-	-
55	5.0	127.14	3.69	2.90	-	-	-	-	-	-
78	1.0	129.56	0.87	0.67	-	-	-	-	-	-
100	1.2	140	15.00	10.71	-	-	-	-	-	-
113	2.0	148	4.00	2.70	-	-	-	-	-	-
63	1.0	148	16.00	10.81	-	-	-	-	-	-
77	1.3	150	12.10	8.07	-	-	-	-	-	-
85	1.3	151.32	0.13	0.09	-	-	-	-	-	-
74	2.0	152	9.70	6.38	-	-	-	-	-	-
125	2.0	153.2	11.20	7.31	-	-	-	-	-	-
98	2.0	159	3.00	1.89	-	-	-	-	-	-
102	1.3	159	36.00	22.64	-	-	-	-	-	-
69	1.1	163	23.00	14.11	-	-	-	-	-	-
56	1.3	181	10.00	5.52	-	-	-	-	-	-
126	1.3	183.582	10.75	5.86	-	-	-	-	-	-
37	1.2	200.526	3.48	1.74	-	-	-	-	-	-
133	4.5	231	14.00	6.06	-	-	-	-	-	-
131	1.2	259.69	5.18	2.00	-	-	-	-	-	-
129	1.0	263.92	51.06	19.35	-	-	-	-	-	-
					W [mg/kg]					
132	1.0	1.6	0.30	18.75	-	-	-	-	-	-
					Y (31 ± 2.96) [mg/kg]					
133	4.5	12	6.00	50.00	-12.85	-6.42	-4.28	3.07	2.84	2.55
89	1.3	13.333	0.71	5.36	-11.95	-5.97	-3.98	10.76	5.81	3.93
96	1.1	23	1.20	5.22	-5.41	-2.70	-1.80	4.20	2.51	1.74
69	1.1	23.9	2.60	10.88	-4.80	-2.40	-1.60	2.37	1.80	1.38
77	1.3	24.6	0.18	0.73	-4.33	-2.16	-1.44	4.30	2.16	1.44
65	1.3	25	2.30	9.20	-4.06	-2.03	-1.35	2.19	1.60	1.20
101	1.0	25	1.00	4.00	-4.06	-2.03	-1.35	3.36	1.92	1.32
132	1.0	26.25	0.30	1.14	-3.21	-1.61	-1.07	3.15	1.60	1.07
56	1.3	26.8	1.50	5.60	-2.84	-1.42	-0.95	1.99	1.27	0.90
124	1.2	27	0.20	0.74	-2.70	-1.35	-0.90	2.68	1.35	0.90
113	2.0	27	1.00	3.70	-2.70	-1.35	-0.90	2.24	1.28	0.88
98	2.0	27.9	0.60	2.15	-2.10	-1.05	-0.70	1.94	1.03	0.69
74	2.0	28	3.48	12.43	-2.03	-1.01	-0.68	0.79	0.66	0.53

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
71	1.1	28	5.00	17.86	-2.03	-1.01	-0.68	0.58	0.52	0.45
126	1.3	28.823	1.66	5.77	-1.47	-0.74	-0.49	0.98	0.64	0.46
37	1.2	29.129	0.36	1.24	-1.27	-0.63	-0.42	1.23	0.63	0.42
79	1.1	37.238	10.31	27.67	4.22	2.11	1.41	0.60	0.58	0.56
36	1.0	43	3.00	6.98	8.11	4.06	2.70	3.59	2.85	2.24
131	1.2	50.58	1.05	2.07	13.24	6.62	4.41	10.81	6.24	4.30
136	1.0	55.64*	1.36	2.44	16.66	8.33	5.55	12.26	7.57	5.31
102	1.3	55.954*	13.00	23.23	16.87	8.44	5.62	1.91	1.87	1.82
75	1.4	56.11*	1.00	1.78	16.98	8.49	5.66	14.07	8.04	5.52
128	1.4	146*	18.32	12.55	77.77	38.88	25.92	6.26	6.20	6.10
					Yb [mg/kg]					
134	5.0	1.4	0.20	14.29	-	-	-	-	-	-
55	5.0	1.781	0.36	20.33	-	-	-	-	-	-
61	5.0	2.737	0.09	3.32	-	-	-	-	-	-
					Zn (66.2 ± 5.63) [mg/kg]					
120	1.4	7.34*	0.39	5.31	-20.89	-10.45	-6.96	20.70	10.42	6.96
96	1.1	34	1.70	5.00	-11.43	-5.71	-3.81	9.79	5.47	3.74
55	1.3	37.174	0.53	1.44	-10.30	-5.15	-3.43	10.12	5.13	3.43
104	1.4	37.254	0.51	1.37	-10.27	-5.14	-3.42	10.11	5.12	3.42
95	1.4	39	4.00	10.26	-9.65	-4.83	-3.22	5.56	3.94	2.91
36	1.0	45	1.00	2.22	-7.53	-3.76	-2.51	7.09	3.70	2.49
100	1.2	45	16.00	35.56	-7.53	-3.76	-2.51	1.30	1.25	1.17
73	1.2	47.099	1.28	2.72	-6.78	-3.39	-2.26	6.17	3.31	2.23
129	1.0	50.76	5.18	10.20	-5.48	-2.74	-1.83	2.62	2.02	1.56
65	1.3	53.4	4.56	8.54	-4.54	-2.27	-1.51	2.39	1.77	1.33
133	4.5	56	5.00	8.93	-3.62	-1.81	-1.21	1.78	1.35	1.04
85	1.3	57.66	0.36	0.62	-3.03	-1.52	-1.01	3.01	1.51	1.01
135	1.0	58.223	3.87	6.65	-2.83	-1.42	-0.94	1.67	1.17	0.86
101	1.0	60	8.00	13.33	-2.20	-1.10	-0.73	0.73	0.63	0.53
116	1.4	60	3.90	6.50	-2.20	-1.10	-0.73	1.29	0.90	0.67
76	2.0	60	4.00	6.67	-2.20	-1.10	-0.73	1.27	0.90	0.66
69	1.1	60.1	9.10	15.14	-2.17	-1.08	-0.72	0.64	0.57	0.49
98	2.0	60.6	1.00	1.65	-1.99	-0.99	-0.66	1.87	0.98	0.66
37	1.2	61.278	1.61	2.63	-1.75	-0.87	-0.58	1.52	0.84	0.57
89	1.3	63.469	2.60	4.10	-0.97	-0.48	-0.32	0.71	0.44	0.31
90	1.3	65	8.00	12.31	-0.43	-0.21	-0.14	0.14	0.12	0.10
74	2.0	66	38.00	57.58	-0.07	-0.04	-0.02	0.01	0.01	0.01
63	1.0	66	5.00	7.58	-0.07	-0.04	-0.02	0.03	0.03	0.02
113	2.0	67	1.00	1.49	0.28	0.14	0.09	0.27	0.14	0.09
126	1.3	67.291	3.33	4.94	0.39	0.19	0.13	0.25	0.17	0.12
92	1.4	69	0.34	0.49	0.99	0.50	0.33	0.99	0.50	0.33
61	5.0	69.3	3.30	4.76	1.10	0.55	0.37	0.71	0.47	0.34
56	1.3	69.9	3.50	5.01	1.31	0.66	0.44	0.82	0.56	0.40
132	1.0	70.35	0.70	1.00	1.47	0.74	0.49	1.43	0.73	0.49
102	1.3	70.577	11.00	15.59	1.55	0.78	0.52	0.39	0.35	0.32
78	1.0	72.92	0.86	1.18	2.39	1.19	0.80	2.28	1.18	0.79
71	1.1	75	7.00	9.33	3.12	1.56	1.04	1.17	0.98	0.80
127	1.3	76.5	2.20	2.88	3.66	1.83	1.22	2.88	1.70	1.18

TABLE 3 (cont.). SUMMARY OF THE REPORTED RESULTS AND THE CALCULATED *z*- AND *u*-SCORES

Laboratory code	Technique code	Analyte concentration	Standard dev.	Relative std. dev., [%]	*z*-scores			*u*-scores		
					$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$
77	1.3	83.5	5.20	6.23	6.14	3.07	2.05	2.93	2.26	1.74
72	1.4	89	18.00	20.22	8.09	4.05	2.70	1.25	1.21	1.15
24	1.1	92	9.00	9.78	9.16	4.58	3.05	2.74	2.43	2.09
131	1.2	121.45*	0.69	0.57	19.61	9.81	6.54	19.05	9.73	6.52
124	1.2	132.2*	0.90	0.68	23.43	11.71	7.81	22.32	11.57	7.77
136	1.0	141.21*	5.78	4.09	26.63	13.31	8.88	11.67	9.29	7.33
75	1.4	234.16*	1.20	0.51	59.62	29.81	19.87	54.85	29.16	19.68
79	1.1	371.945*	34.39	9.25	108.53	54.26	36.18	8.86	8.77	8.63
				Zr (135 ± 10.32) [mg/kg]						
124	1.2	61.8	0.50	0.81	-14.18	-7.09	-4.73	14.12	7.08	4.73
95	1.4	64	6.00	9.38	-13.76	-6.88	-4.59	8.97	5.95	4.28
76	2.0	96	2.10	2.19	-7.56	-3.78	-2.52	7.00	3.70	2.50
115	2.0	102	24.00	23.53	-6.39	-3.20	-2.13	1.34	1.26	1.16
96	1.1	105	5.30	5.05	-5.81	-2.91	-1.94	4.06	2.59	1.83
133	4.5	107	25.00	23.36	-5.43	-2.71	-1.81	1.10	1.04	0.95
135	1.0	108.882	8.22	7.55	-5.06	-2.53	-1.69	2.69	1.98	1.49
113	2.0	111	1.00	0.90	-4.65	-2.33	-1.55	4.57	2.31	1.55
74	2.0	114	24.76	21.72	-4.07	-2.03	-1.36	0.83	0.78	0.72
65	1.3	115.3	12.60	10.93	-3.82	-1.91	-1.27	1.45	1.21	0.99
69	1.1	117	11.60	9.91	-3.49	-1.74	-1.16	1.42	1.16	0.93
126	1.3	117.51	5.54	4.72	-3.39	-1.69	-1.13	2.31	1.49	1.06
56	1.3	122	6.00	4.92	-2.52	-1.26	-0.84	1.64	1.09	0.78
63	1.0	123	8.00	6.50	-2.33	-1.16	-0.78	1.26	0.92	0.69
98	2.0	126	3.00	2.38	-1.74	-0.87	-0.58	1.51	0.84	0.57
73	1.2	126.902	20.57	16.21	-1.57	-0.78	-0.52	0.38	0.35	0.31
132	1.0	131.175	1.60	1.22	-0.74	-0.37	-0.25	0.71	0.37	0.25
71	1.1	145	16.00	11.03	1.94	0.97	0.65	0.59	0.53	0.45
100	1.2	153	6.00	3.92	3.49	1.74	1.16	2.27	1.51	1.08
101	1.0	160	3.00	1.88	4.84	2.42	1.61	4.19	2.33	1.59
77	1.3	166	8.50	5.12	6.01	3.00	2.00	3.12	2.32	1.76
79	1.1	166.998	7.29	4.37	6.20	3.10	2.07	3.58	2.53	1.87
129	1.0	169.37	22.50	13.28	6.66	3.33	2.22	1.49	1.39	1.26
102	1.3	176.172	36.00	20.43	7.98	3.99	2.66	1.13	1.10	1.05
36	1.0	204	1.00	0.49	13.37	6.68	4.46	13.13	6.65	4.45
136	1.0	213.21	3.41	1.60	15.15	7.58	5.05	12.64	7.19	4.93
90	1.3	230	25.00	10.87	18.41	9.20	6.14	3.72	3.51	3.23
131	1.2	254.19*	0.66	0.26	23.10	11.55	7.70	22.91	11.52	7.69
78	1.0	298.44*	5.97	2.00	31.67	15.83	10.56	20.71	13.71	9.85
104	1.4	7195.181*	524.34	7.29	1368	684.02	456.01	13.46	13.46	13.46

TABLE 4. THE COMBINED *z*-SCORES FOR THE PARTICIPATING LABORATORIES

Lab Code	Number of analytes	Rescaled sum of scores (RSZ)			Sum of squared scores (SSZ)			Critical value
		$k = 0.5$	$k = 1.0$	$k = 1.5$	$k = 0.5$	$k = 1.0$	$k = 1.5$	χ^2
24	8	26.41	13.21	8.80	1403	351	156	17.53
36	9	-18.26	-9.13	-6.09	3838	959	426	19.02
37	19	-17.92	-8.96	-5.97	742	185	82.43	32.85
53	10	-19.94	-9.97	-6.65	763	191	84.80	20.48
55	15	-10.06	-5.03	-3.35	402	100.59	44.71	27.49
56	13	-3.60	-1.80	-1.20	73.27	18.32	8.14	24.74
61	10	-.84	-.42	-.28	123.43	30.86	13.71	20.48
63	18	111.27	55.64	37.09	221949	55487	24661	31.53
65	23	-8.10	-4.05	-2.70	4457	1114	495	38.08
69	18	67.90	33.95	22.63	32016	8004	3557	31.53
71	10	25.47	12.73	8.49	5923	1481	658	20.48
72	10	35.59	17.79	11.86	7988	1997	888	20.48
73	10	-23.29	-11.64	-7.76	1226	307	136.27	20.48
74	18	3.33	1.66	1.11	387	96.80	43.02	31.53
75	19	391	195	130.28	1243831	310958	138203	32.85
76	16	-9.75	-4.87	-3.25	617	154	68.56	28.85
77	14	68.96	34.48	22.99	55903	13976	6211	26.12
78	19	54.67	27.33	18.22	13496	3374	1500	32.85
79	11	64.61	32.31	21.54	25696	6424	2855	21.92
85	15	101.35	50.67	33.78	147972	36993	16441	27.49
89	12	43.89	21.95	14.63	25728	6432	2859	23.34
90	10	-2.51	-1.25	-.84	1068	267	118.63	20.48
92	4	-2.95	-1.47	-.98	17.29	4.32	1.92	11.14
95	11	-45.20	-22.60	-15.07	2537	634	282	21.92
96	12	144.17	72.09	48.06	173803	43451	19311	23.34
98	17	-8.35	-4.17	-2.78	210	52.55	23.35	30.19
100	13	191	95.47	63.64	384224	96056	42692	24.74
101	13	10.17	5.08	3.39	369	92.20	40.98	24.74
102	10	11.26	5.63	3.75	408	102.05	45.36	20.48
104	13	742	371	247	3742519	935630	415835	24.74
113	19	28.79	14.40	9.60	7492	1873	832	32.85
115	12	25.11	12.56	8.37	6692	1673	744	23.34
116	14	-22.47	-11.23	-7.49	2519	630	280	26.12
119	8	8243	4121	2748	532713647	133178412	59190405	17.53
120	10	-131.91	-65.96	-43.97	24871	6218	2763	20.48
124	19	127.96	63.98	42.65	155937	38984	17326	32.85
125	7	-2.05	-1.03	-.68	52.26	13.06	5.81	16.01
126	24	-1.32	-.66	-.44	1209	302	134.39	39.36
127	16	45.17	22.58	15.06	7945	1986	883	28.85
128	13	89.48	44.74	29.83	32399	8100	3600	24.74
129	9	29.19	14.59	9.73	8514	2129	946	19.02
131	18	201	100.32	66.88	201889	50472	22432	31.53
132	21	27.20	13.60	9.07	5830	1458	648	35.48
133	15	17.15	8.58	5.72	2555	639	284	27.49
134	3	-7.46	-3.73	-2.49	92.80	23.20	10.31	9.35
135	7	-12.97	-6.48	-4.32	205	51.30	22.80	16.01
136	17	69.24	34.62	23.08	31263	7816	3474	30.19

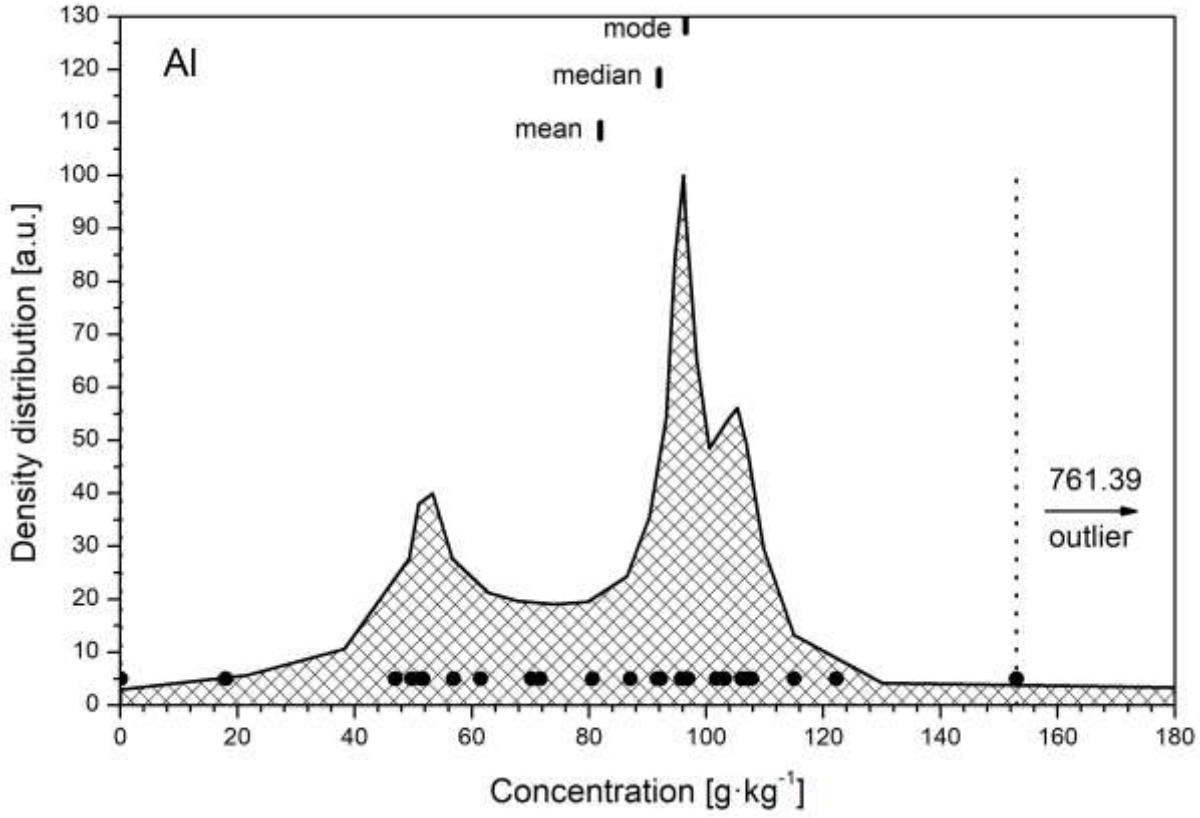

FIG. 3. The density distribution function for the analyte Al.

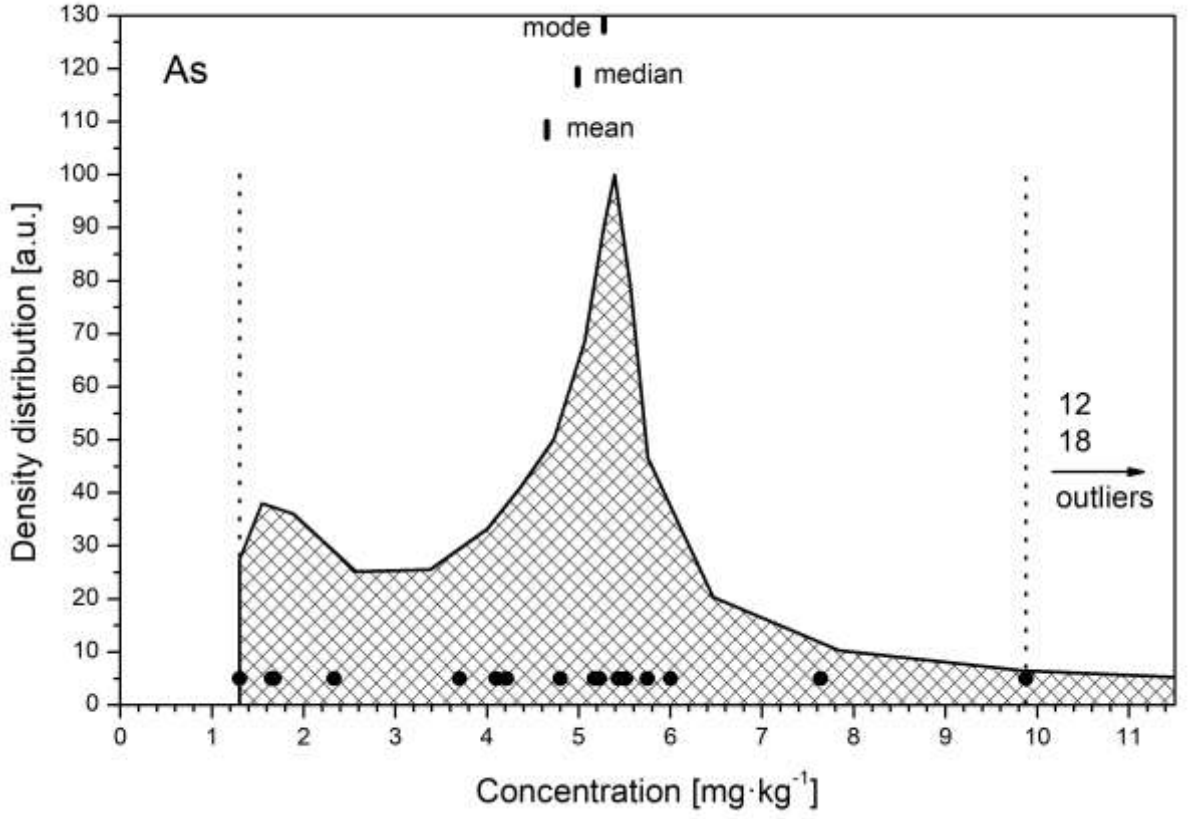

FIG. 4. The density distribution function for the analyte As.

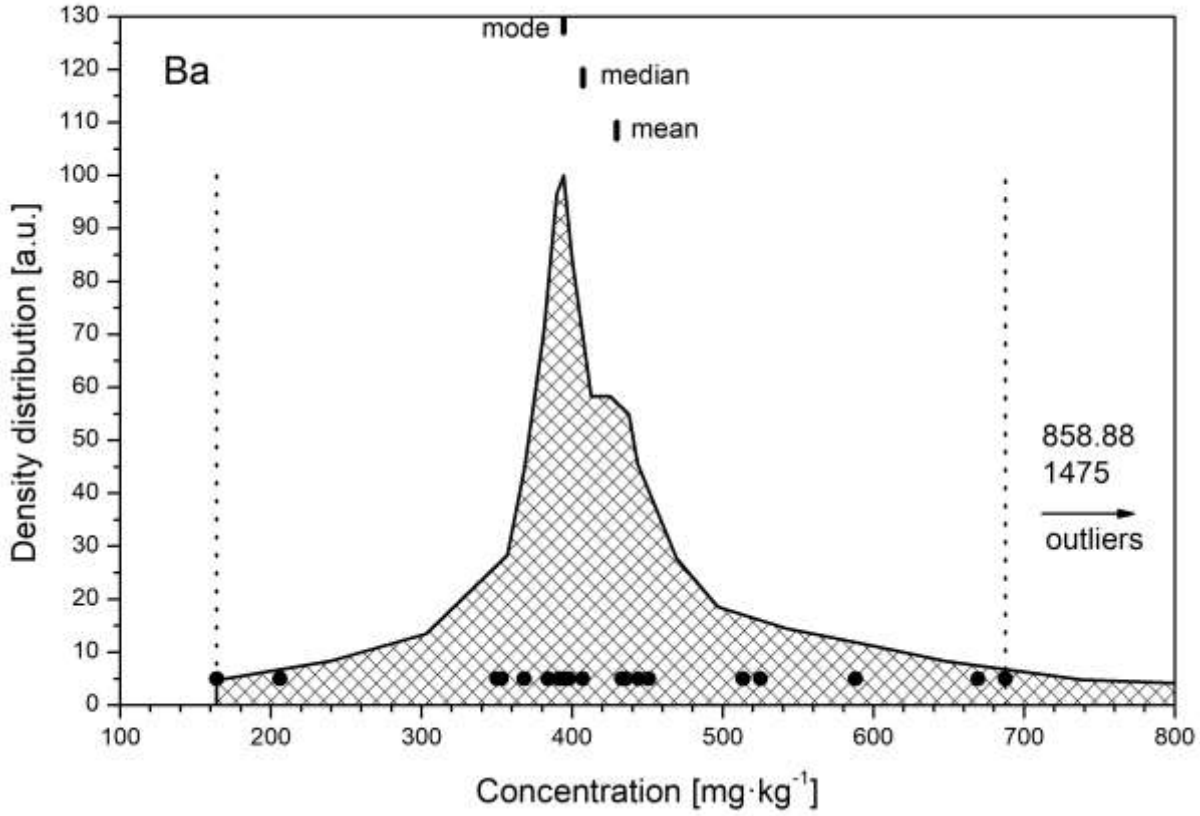

FIG. 5. The density distribution function for the analyte Ba.

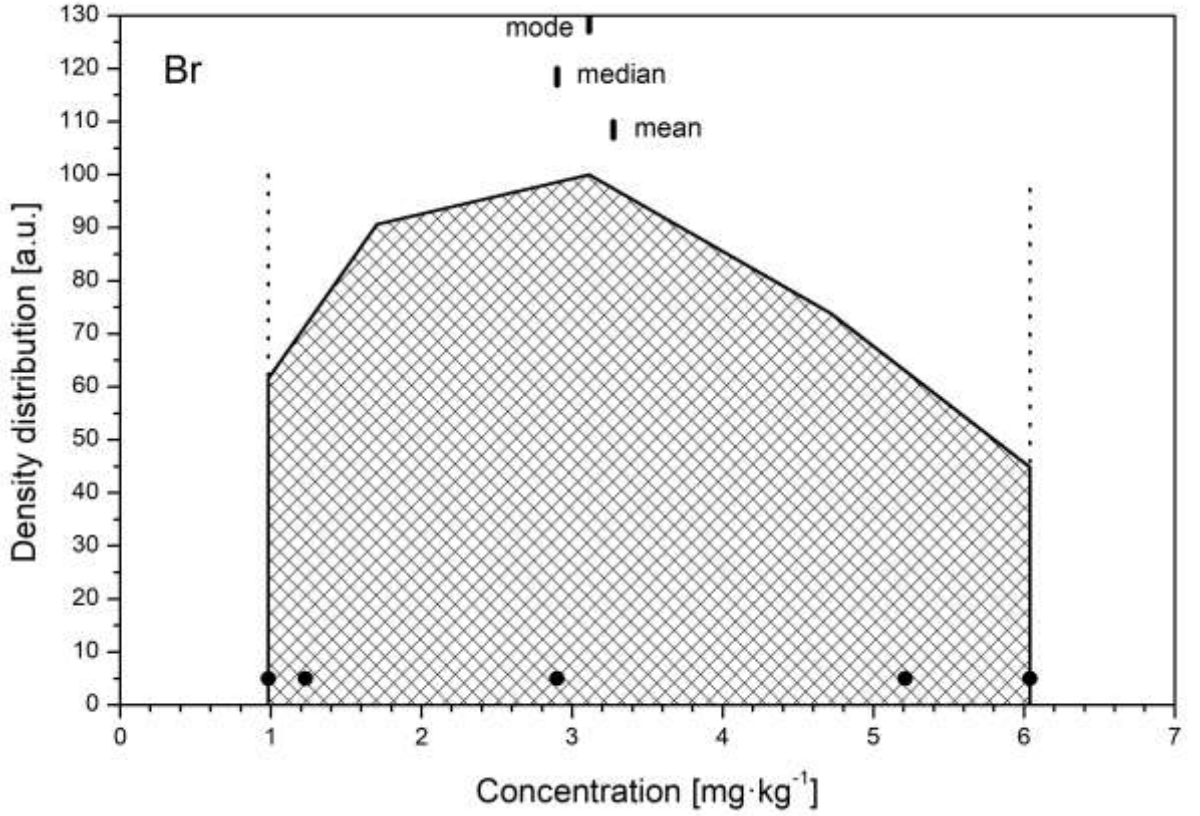

FIG. 6. The density distribution function for the analyte Br.

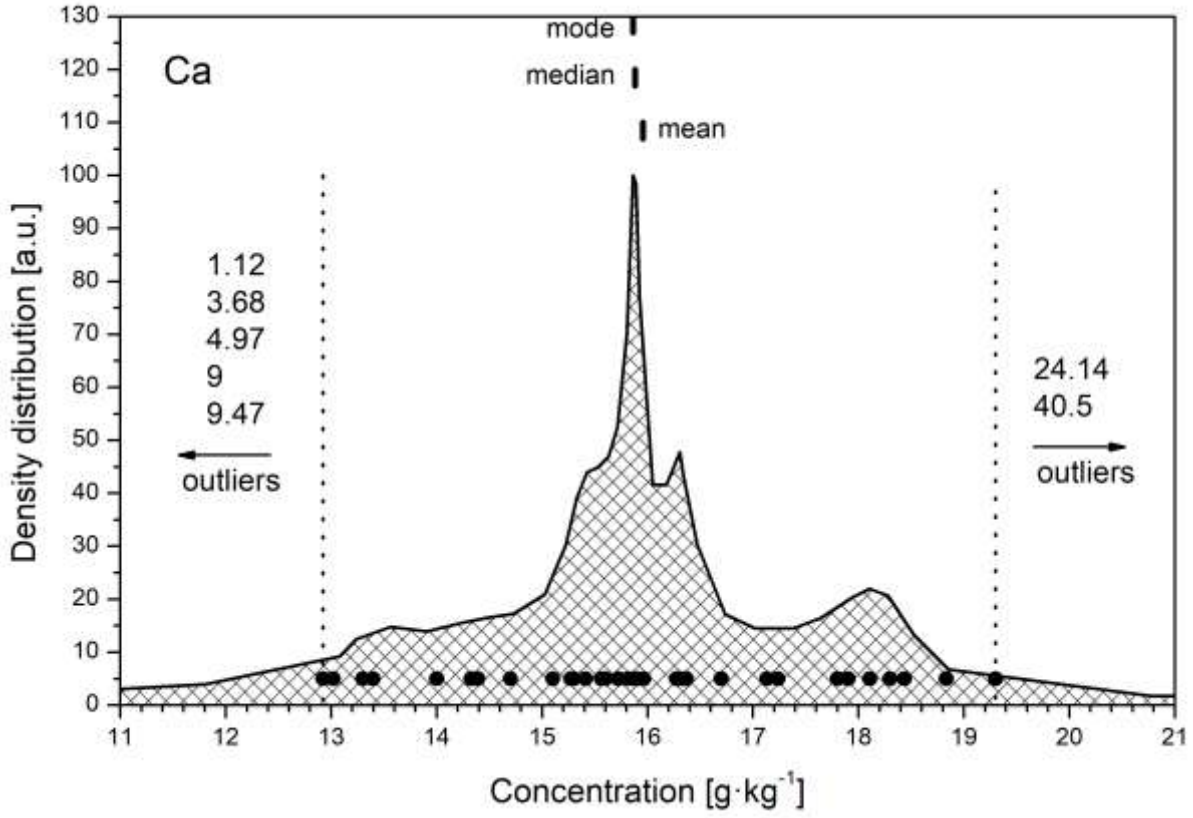

FIG. 7. The density distribution function for the analyte Ca.

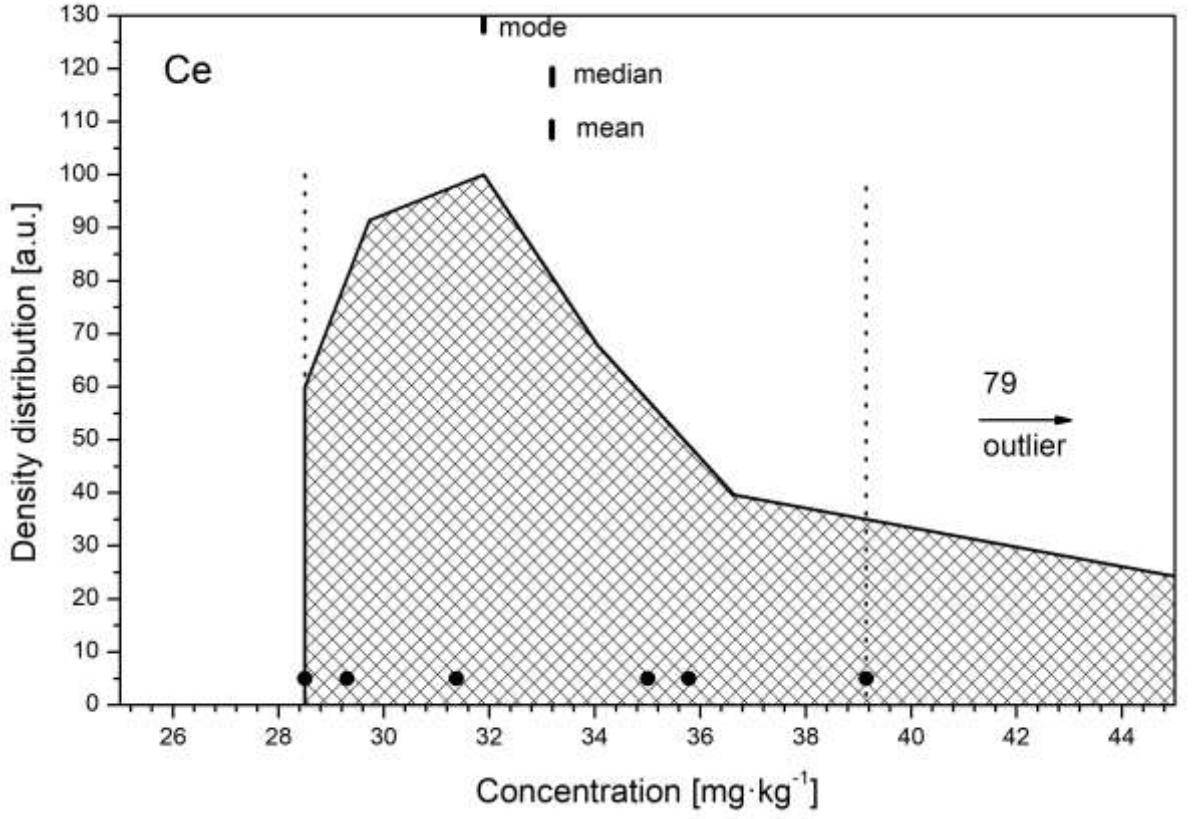

FIG. 8. The density distribution function for the analyte Ce.

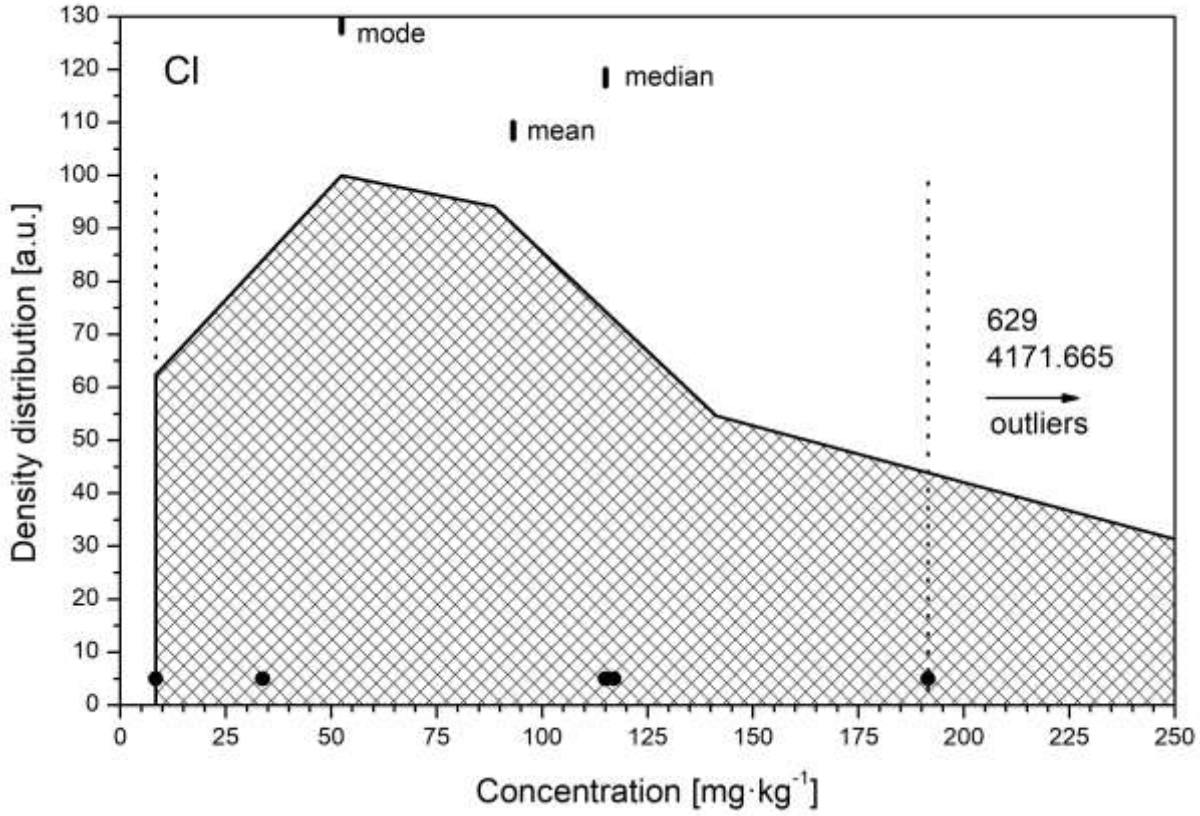

FIG. 9. The density distribution function for the analyte Cl.

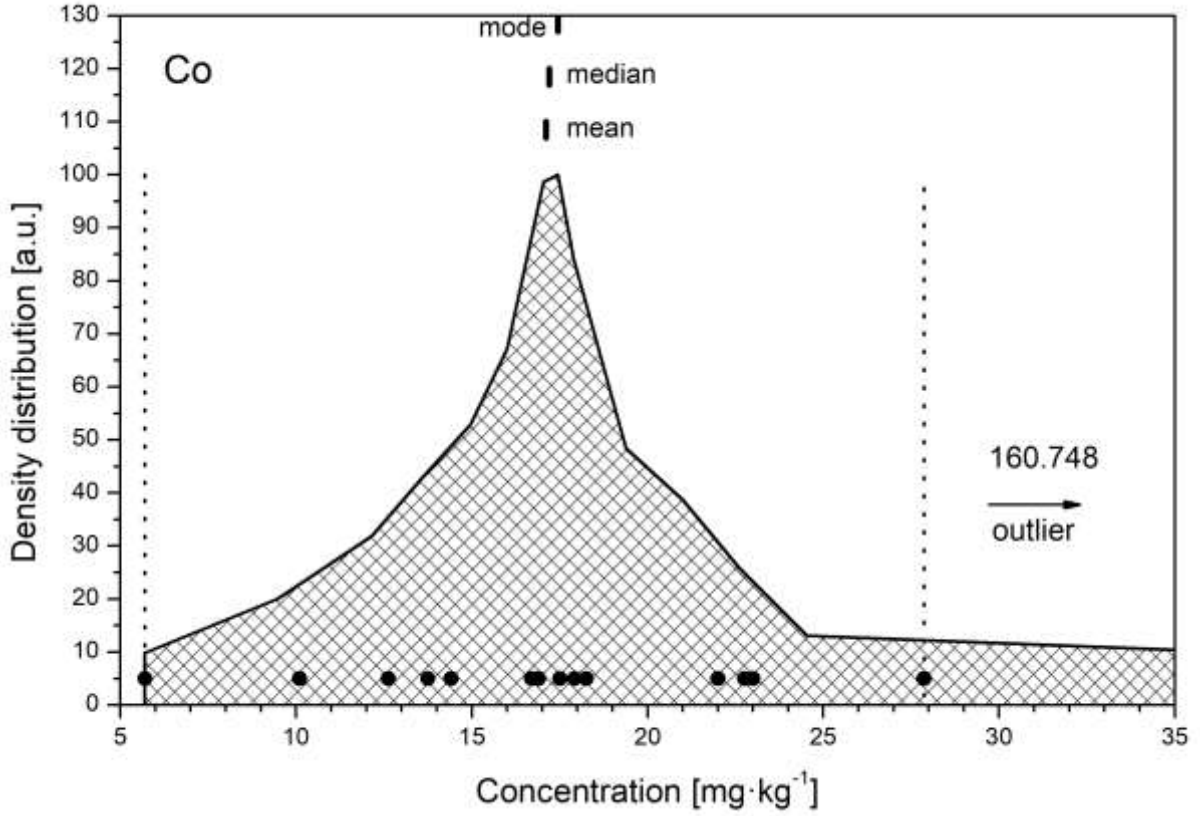

FIG. 10. The density distribution function for the analyte Co.

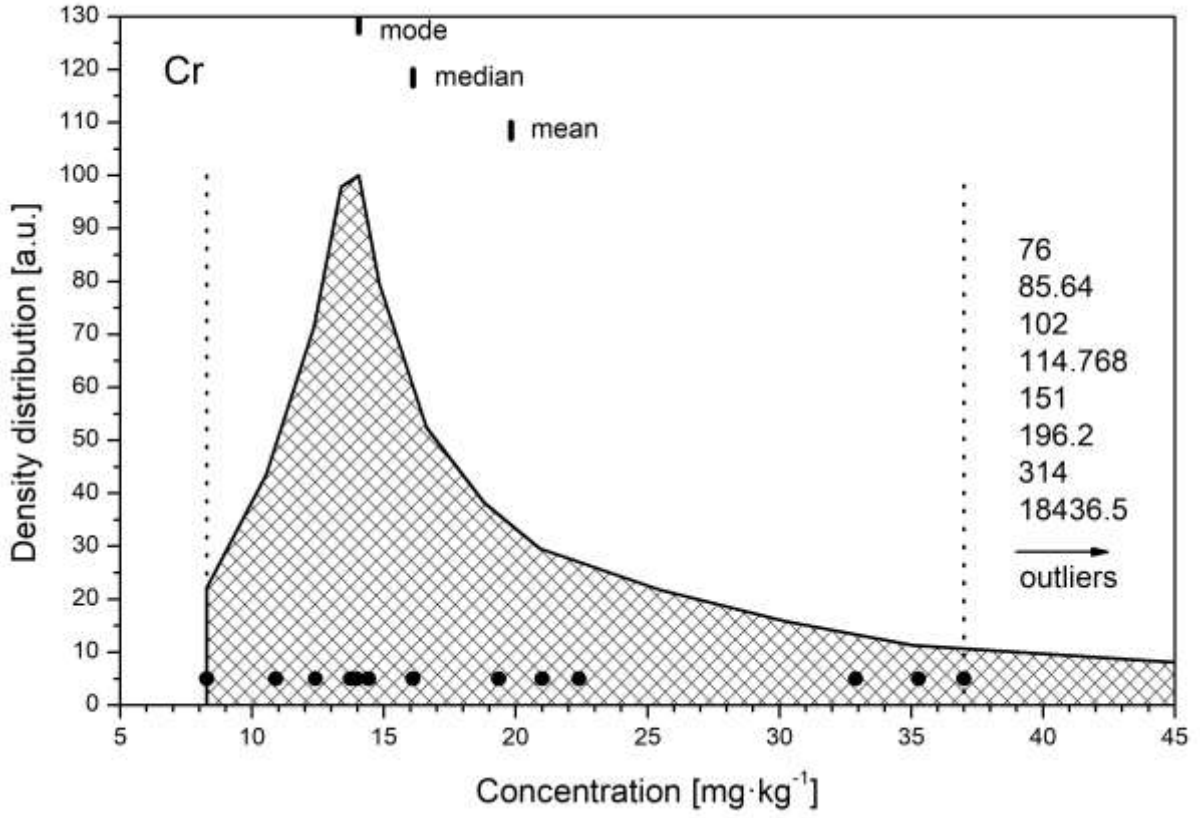

FIG. 11. The density distribution function for the analyte Cr.

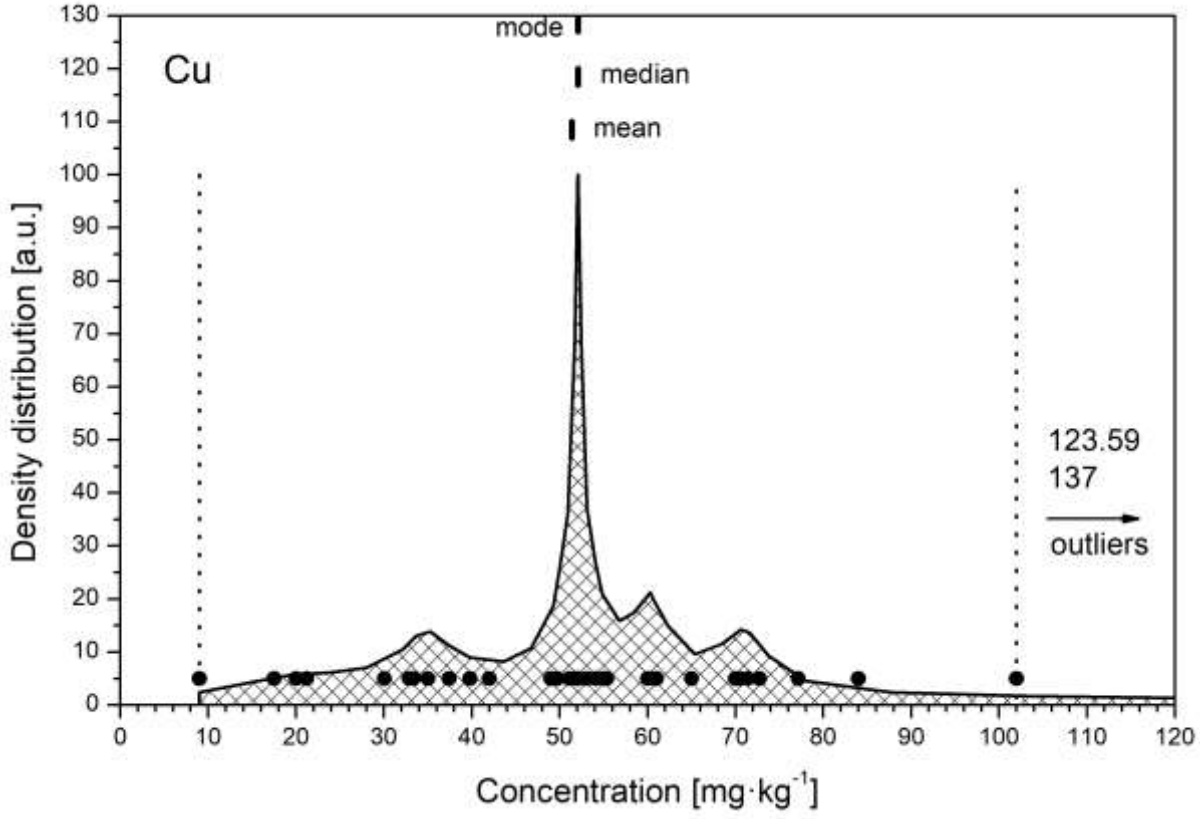

FIG. 12. The density distribution function for the analyte Cu.

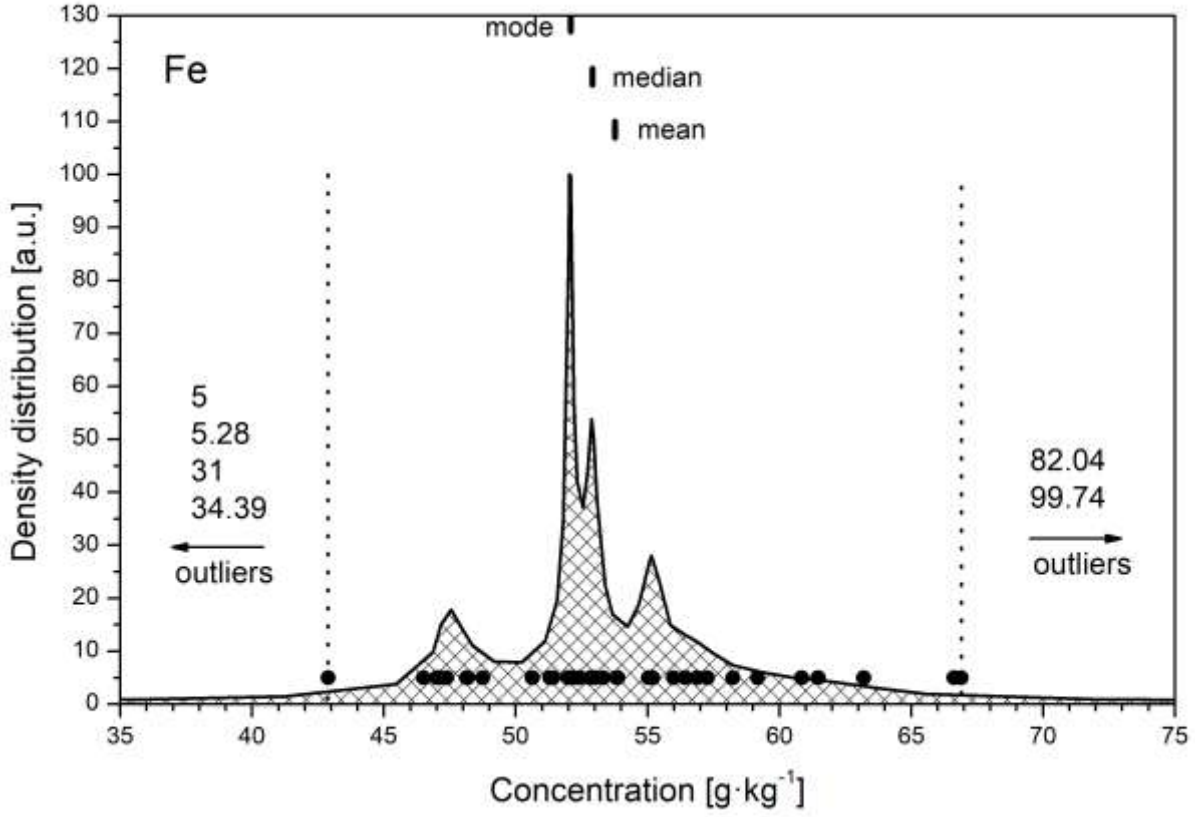

FIG. 13. The density distribution function for the analyte Fe.

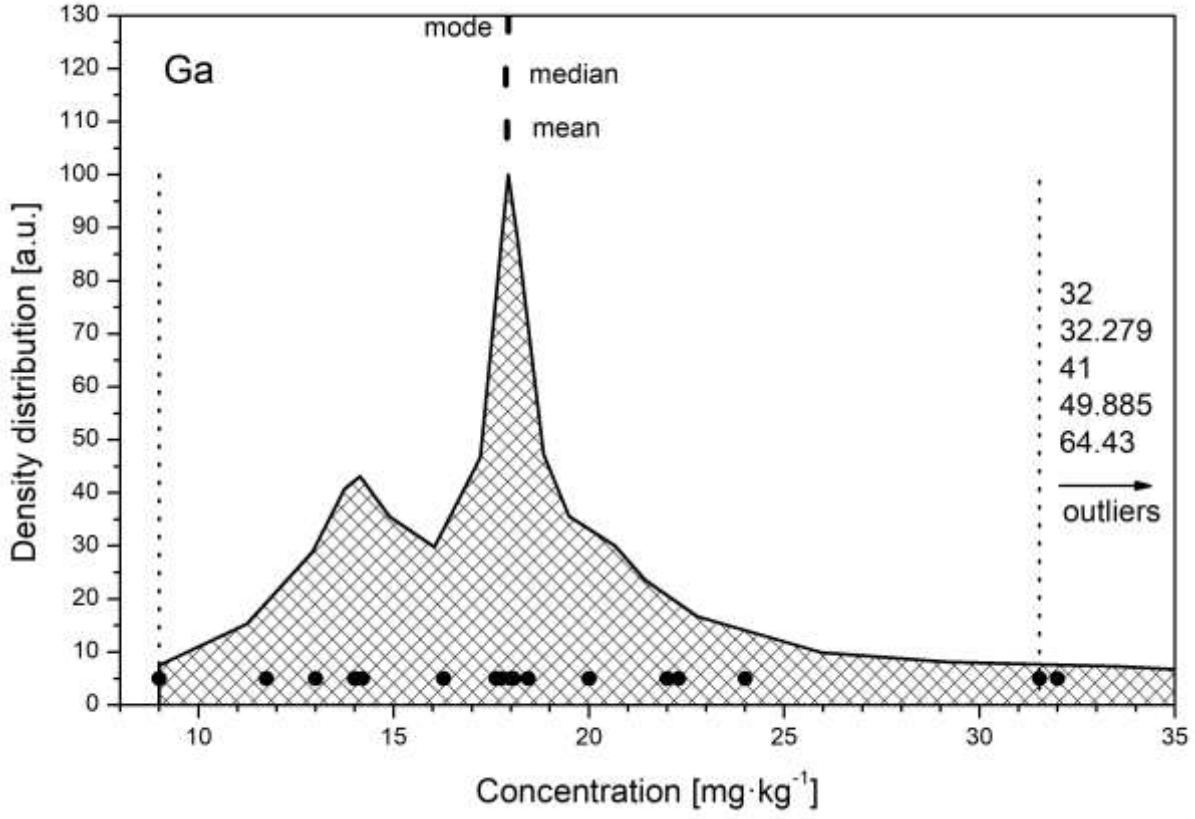

FIG. 14. The density distribution function for the analyte Ga.

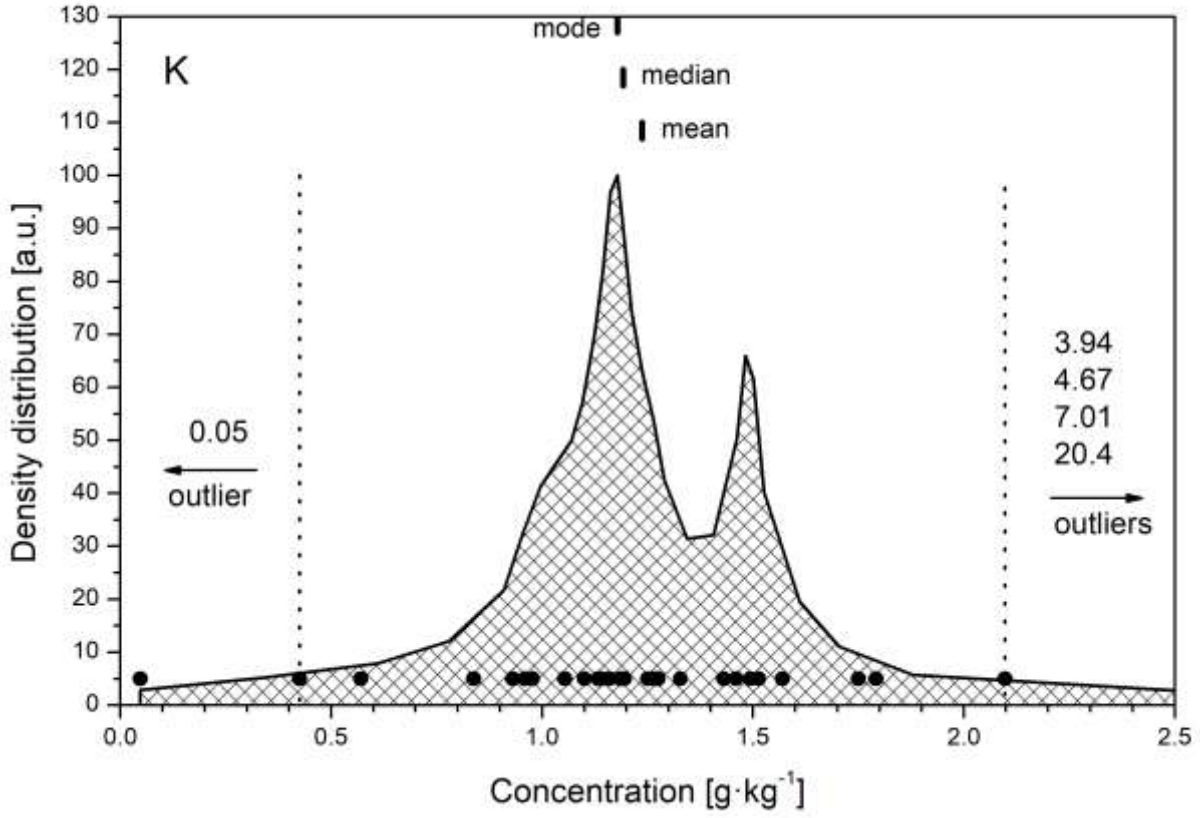

FIG. 15. The density distribution function for the analyte K.

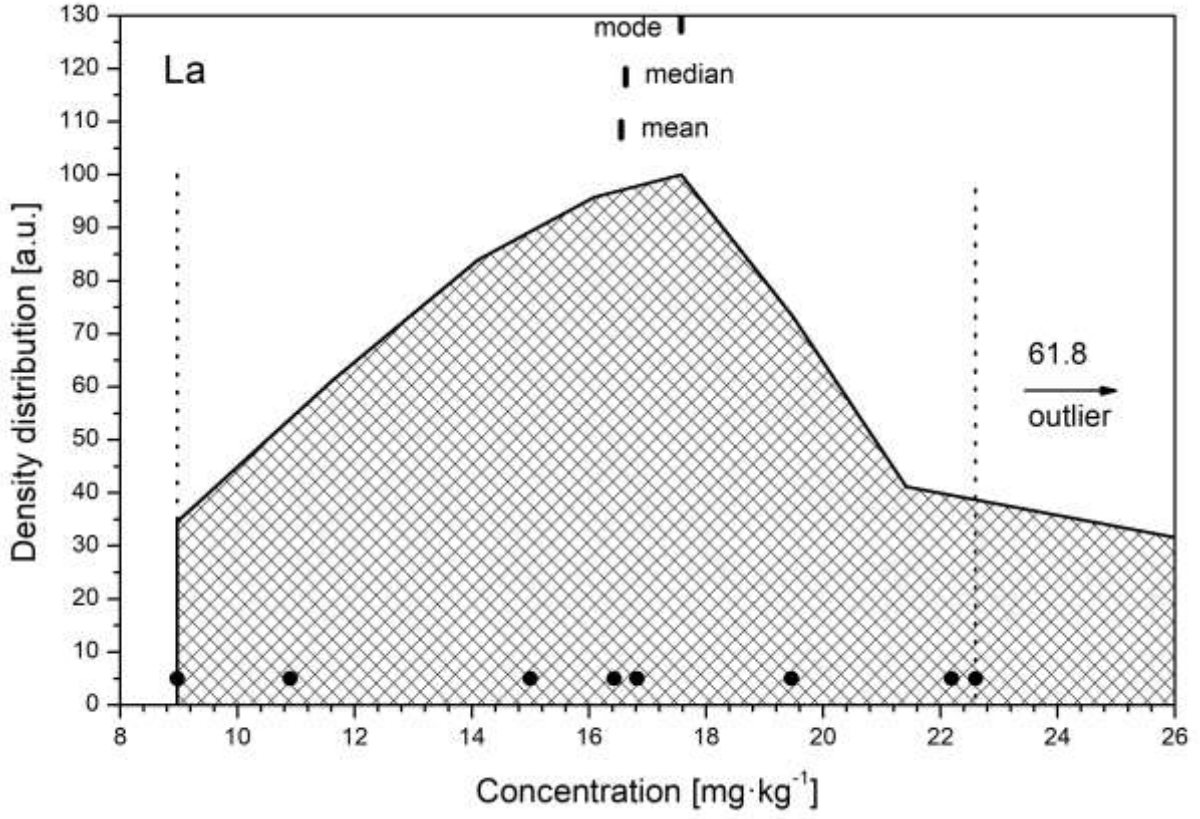

FIG. 16. The density distribution function for the analyte La.

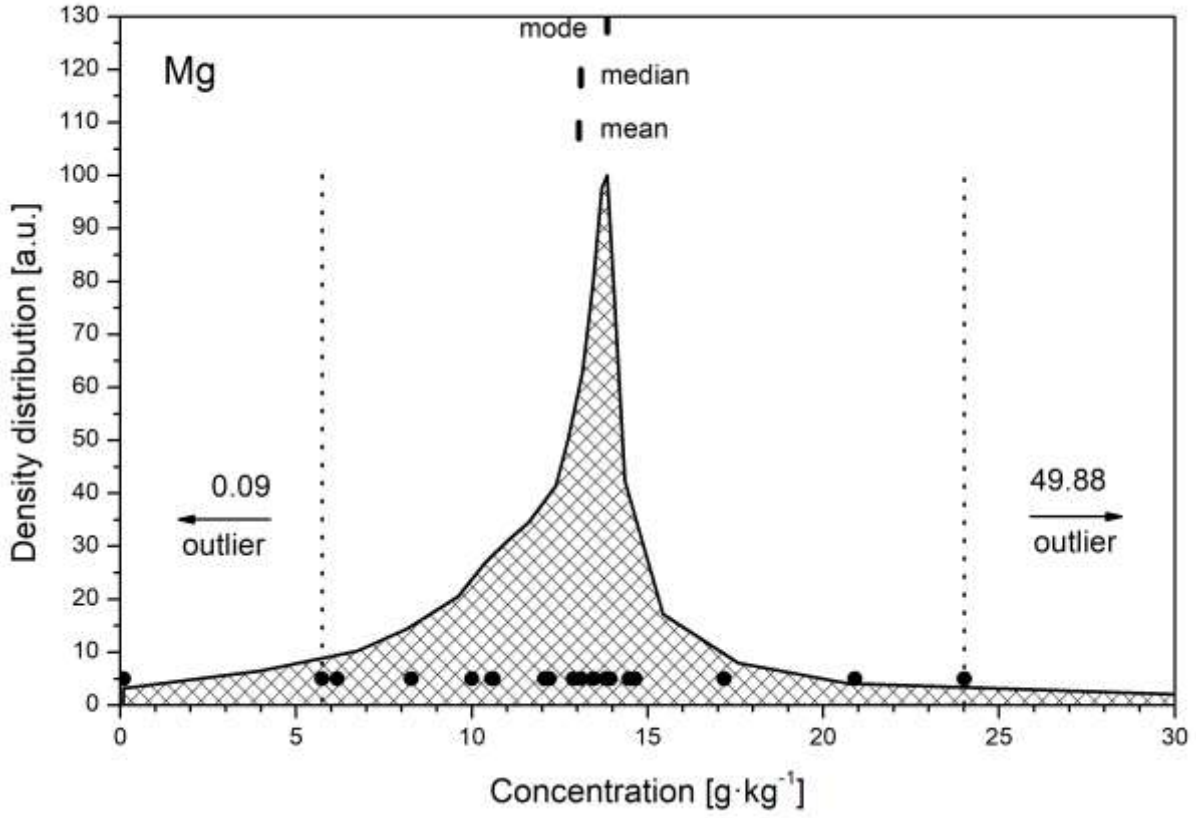

FIG. 17. The density distribution function for the analyte Mg.

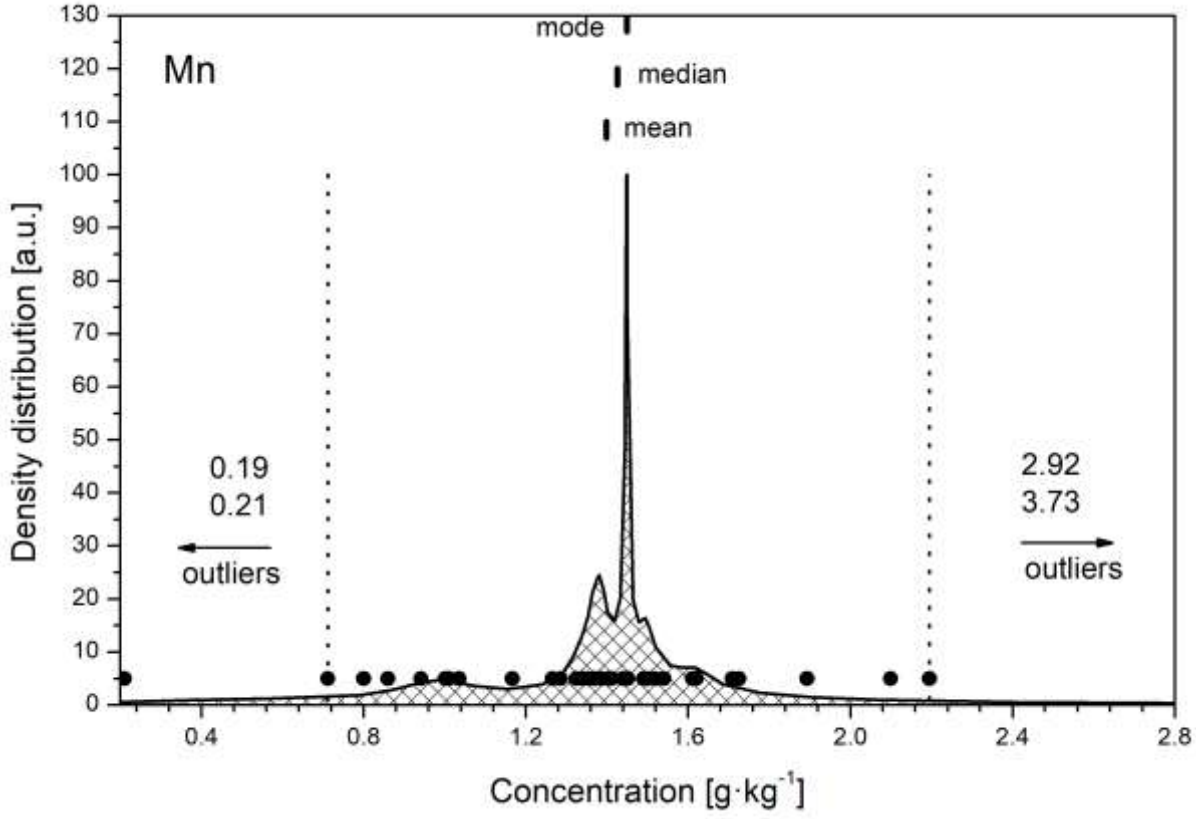

FIG. 18. The density distribution function for the analyte Mn.

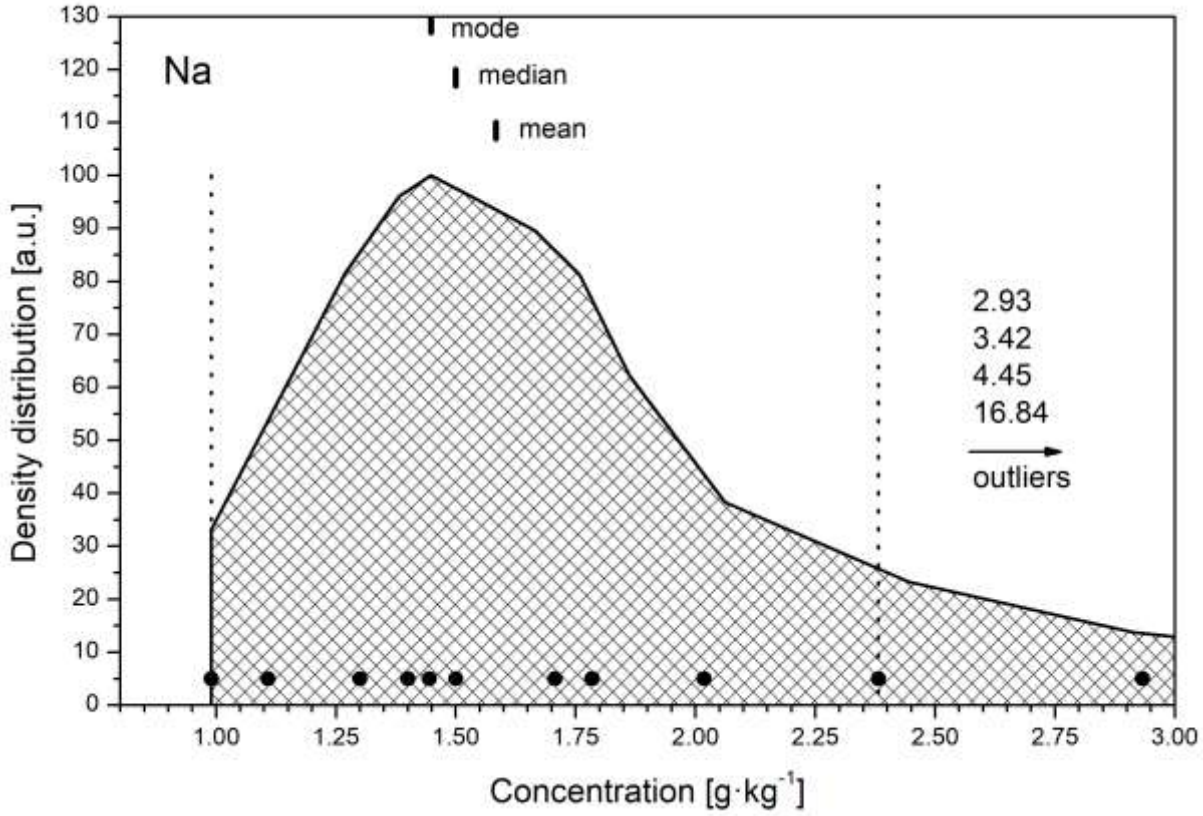

FIG. 19. The density distribution function for the analyte Na.

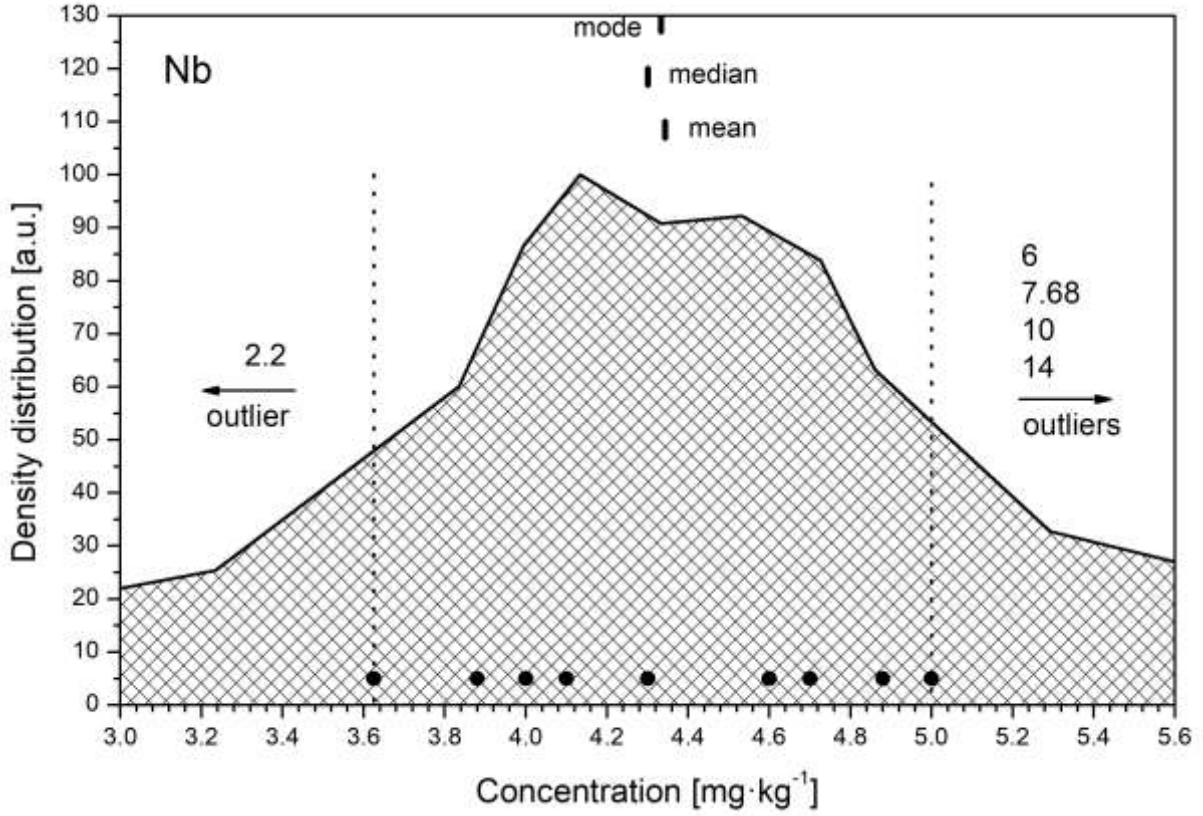

FIG. 20. The density distribution function for the analyte Nb.

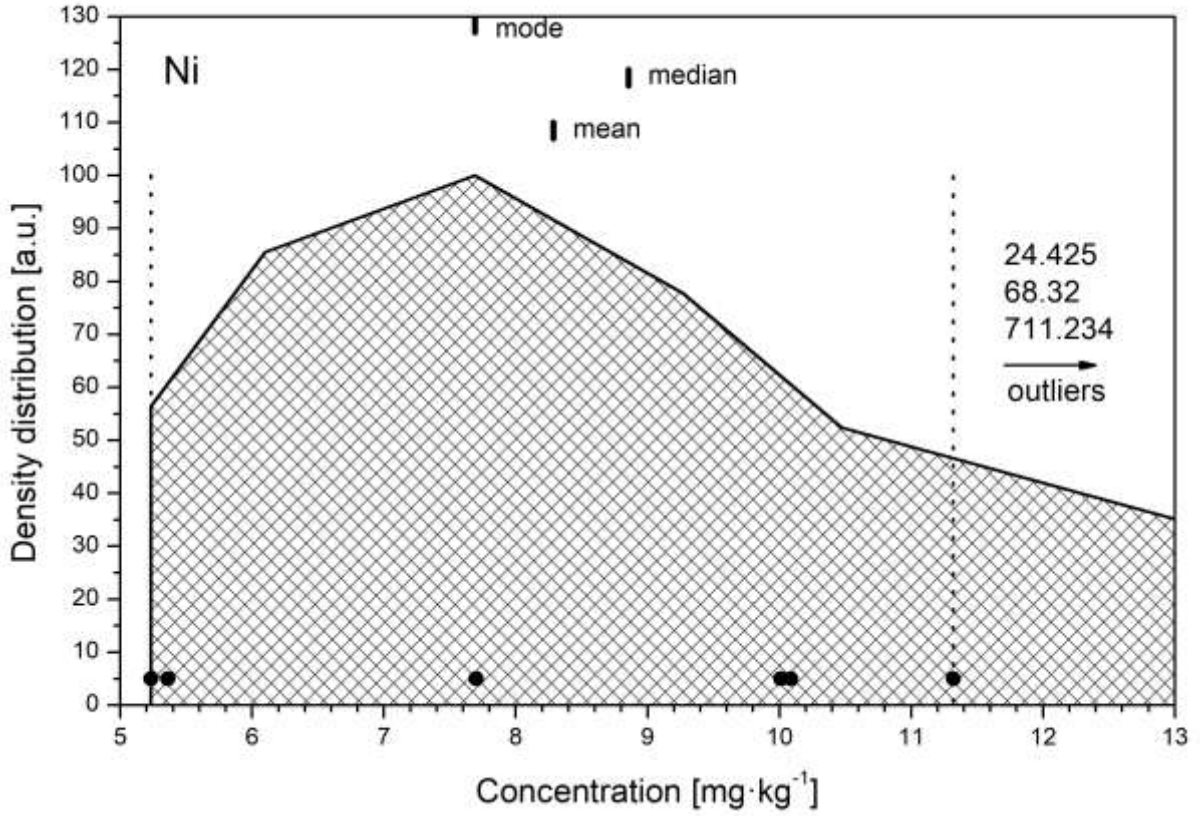

FIG. 21. The density distribution function for the analyte Ni.

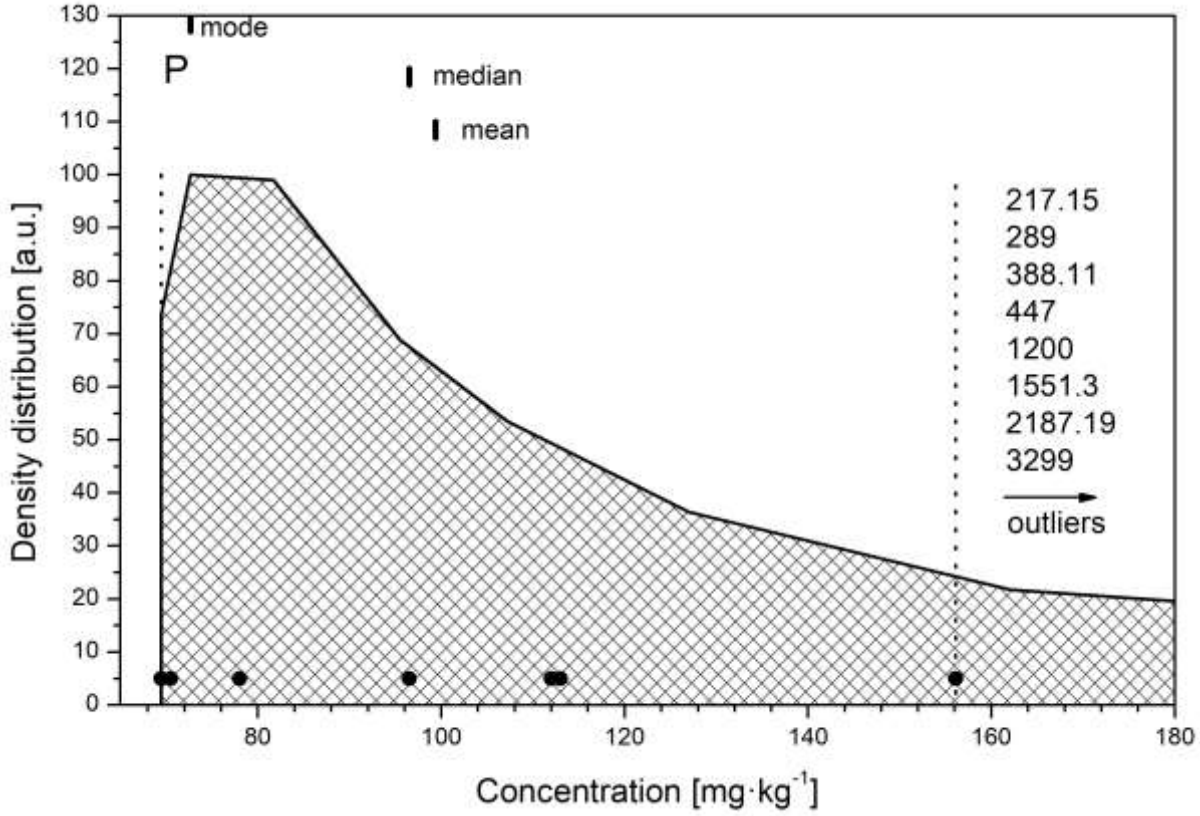

FIG. 22. The density distribution function for the analyte P.

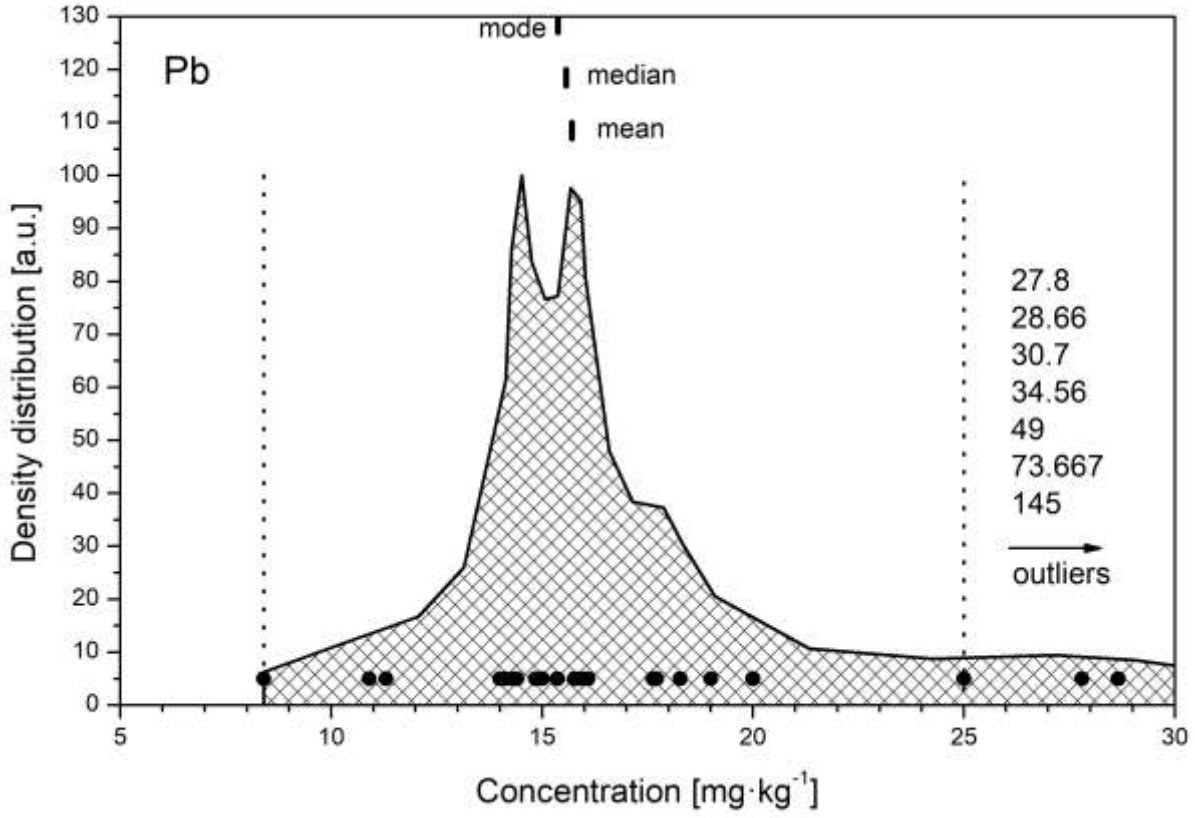

FIG. 23. The density distribution function for the analyte Pb.

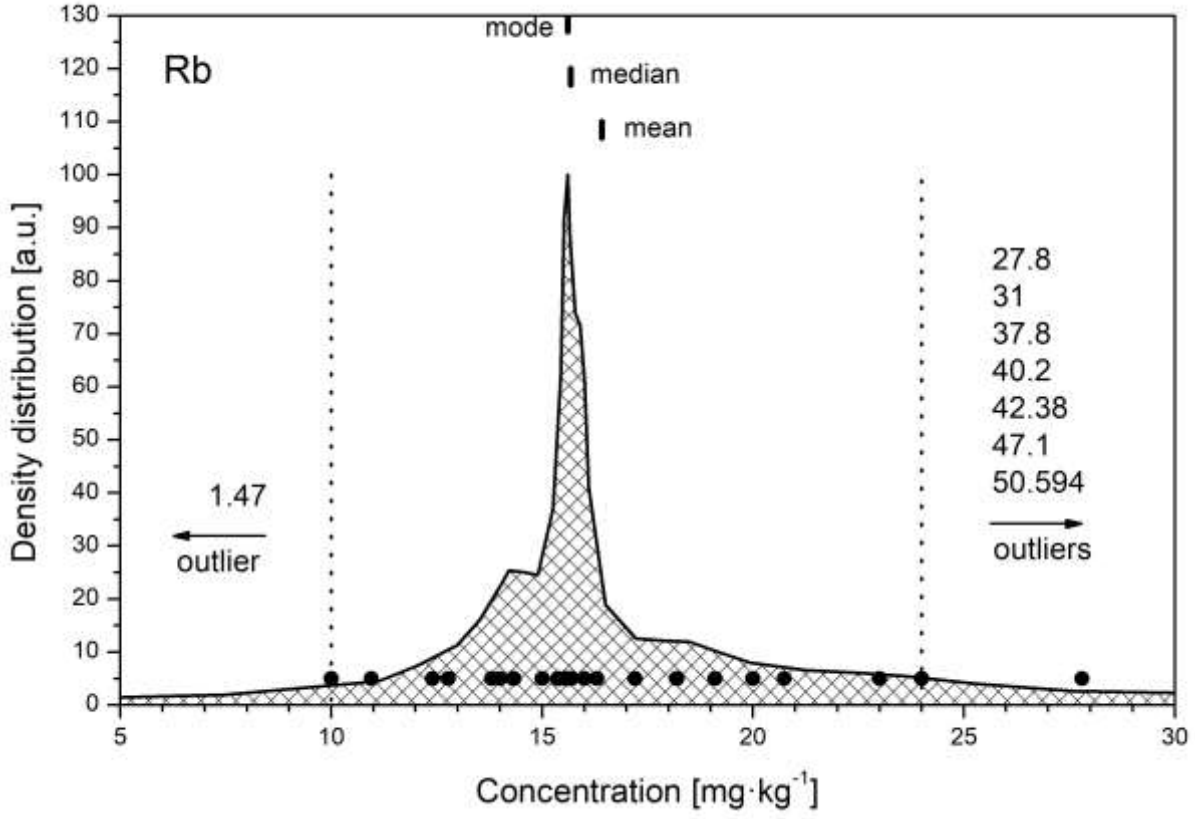

FIG. 24. The density distribution function for the analyte Rb.

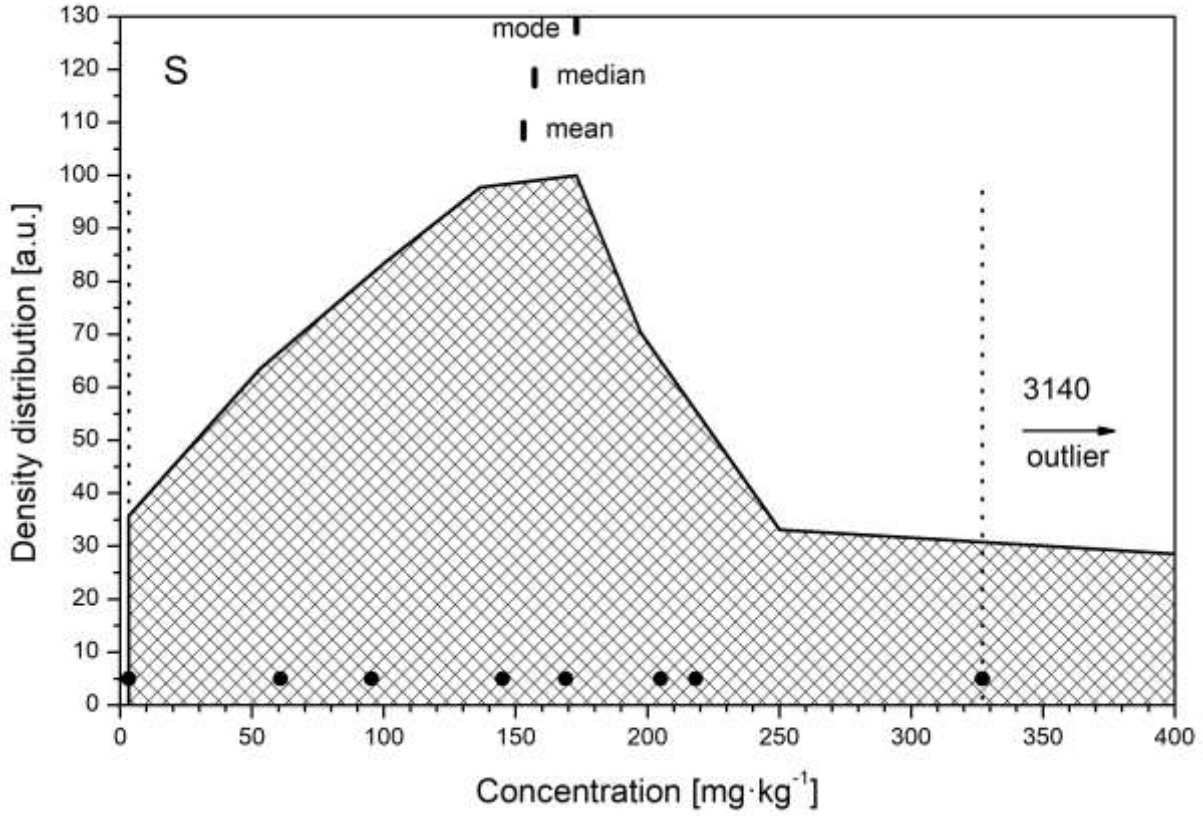

FIG. 25. The density distribution function for the analyte S.

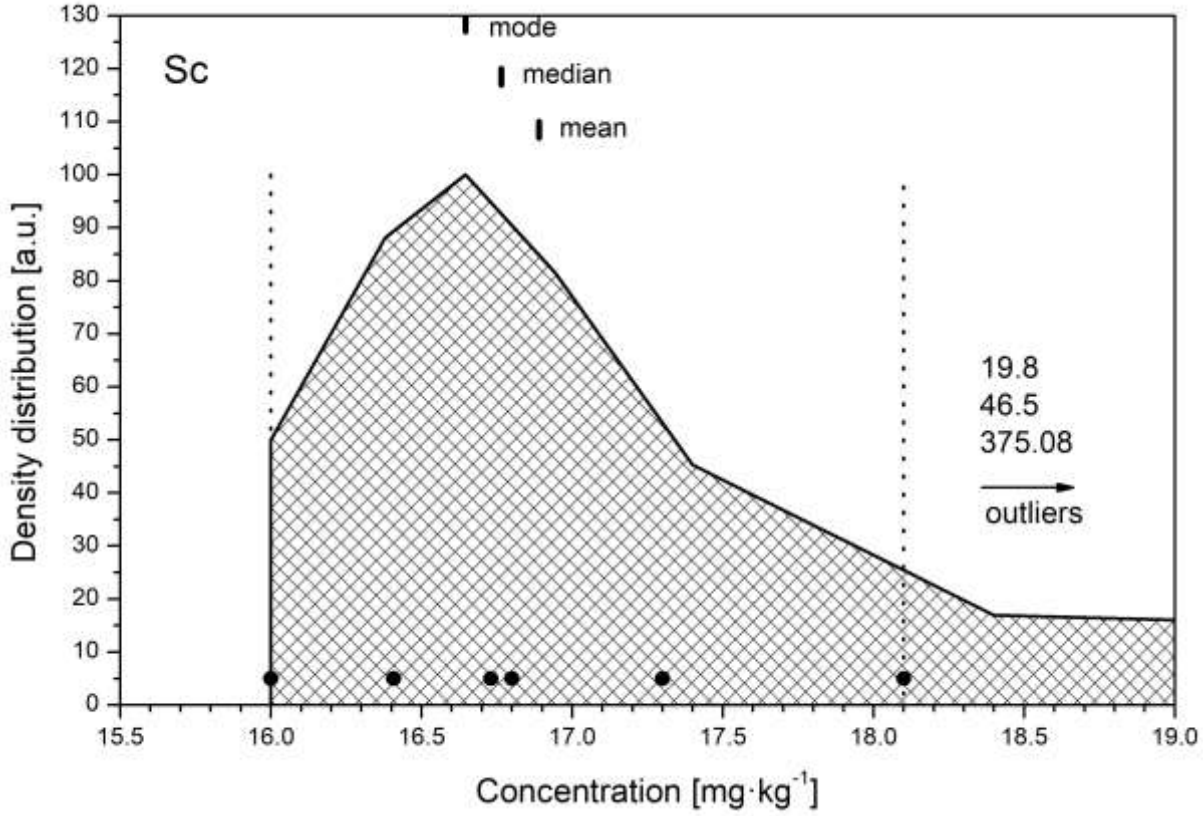

FIG. 26. The density distribution function for the analyte Sc.

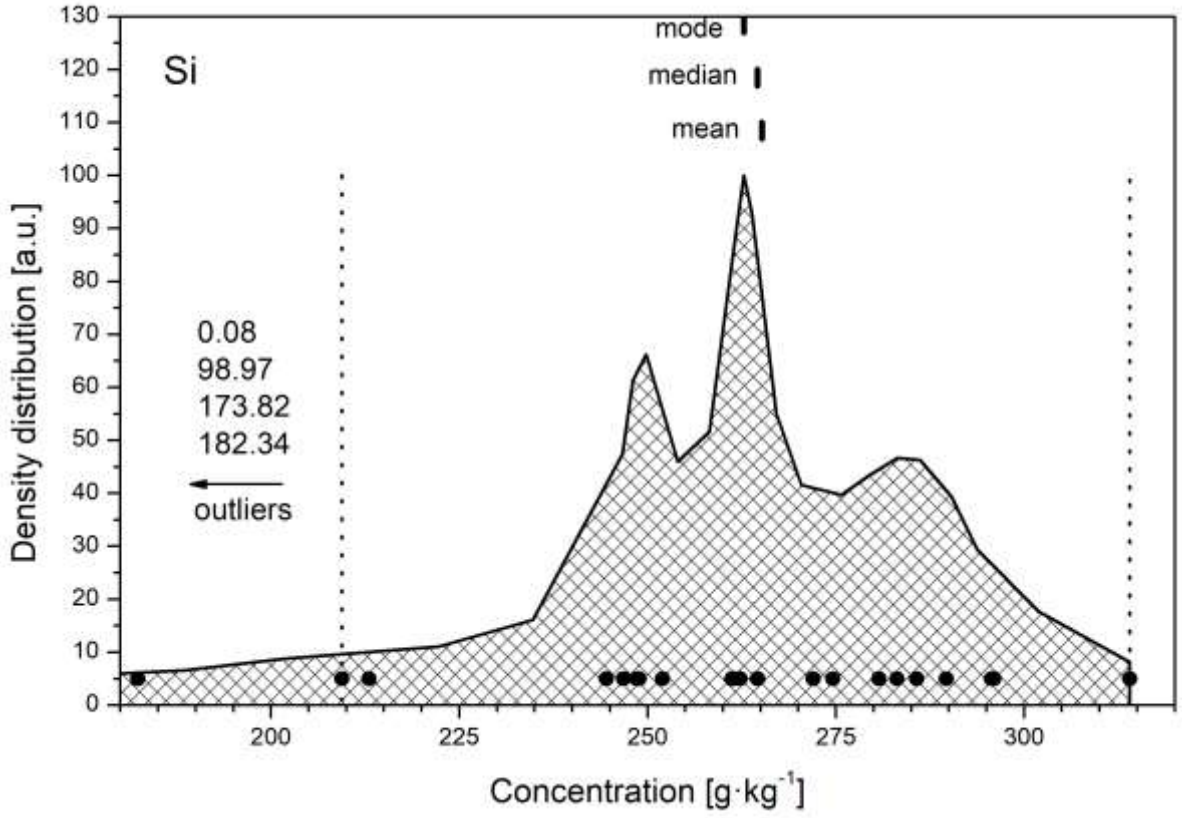

FIG. 27. The density distribution function for the analyte Si.

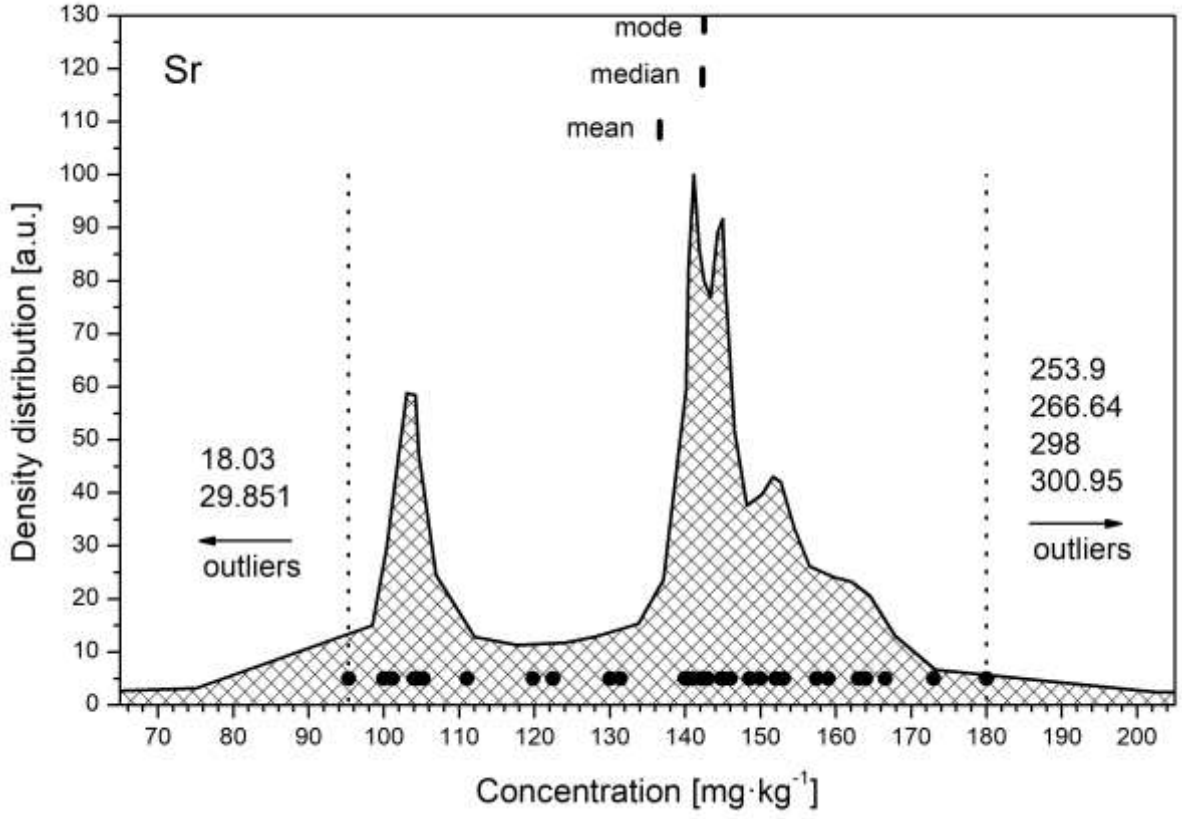

FIG. 28. The density distribution function for the analyte Sr.

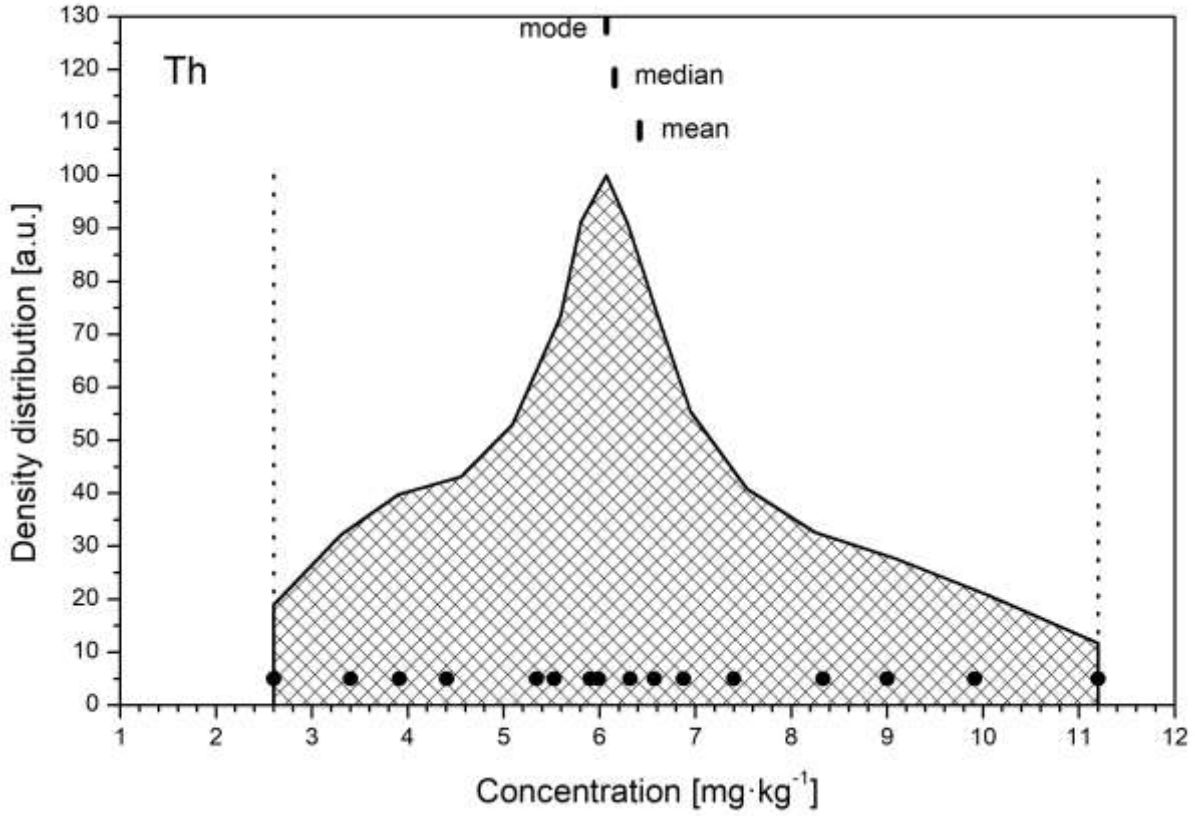

FIG. 29. The density distribution function for the analyte Th.

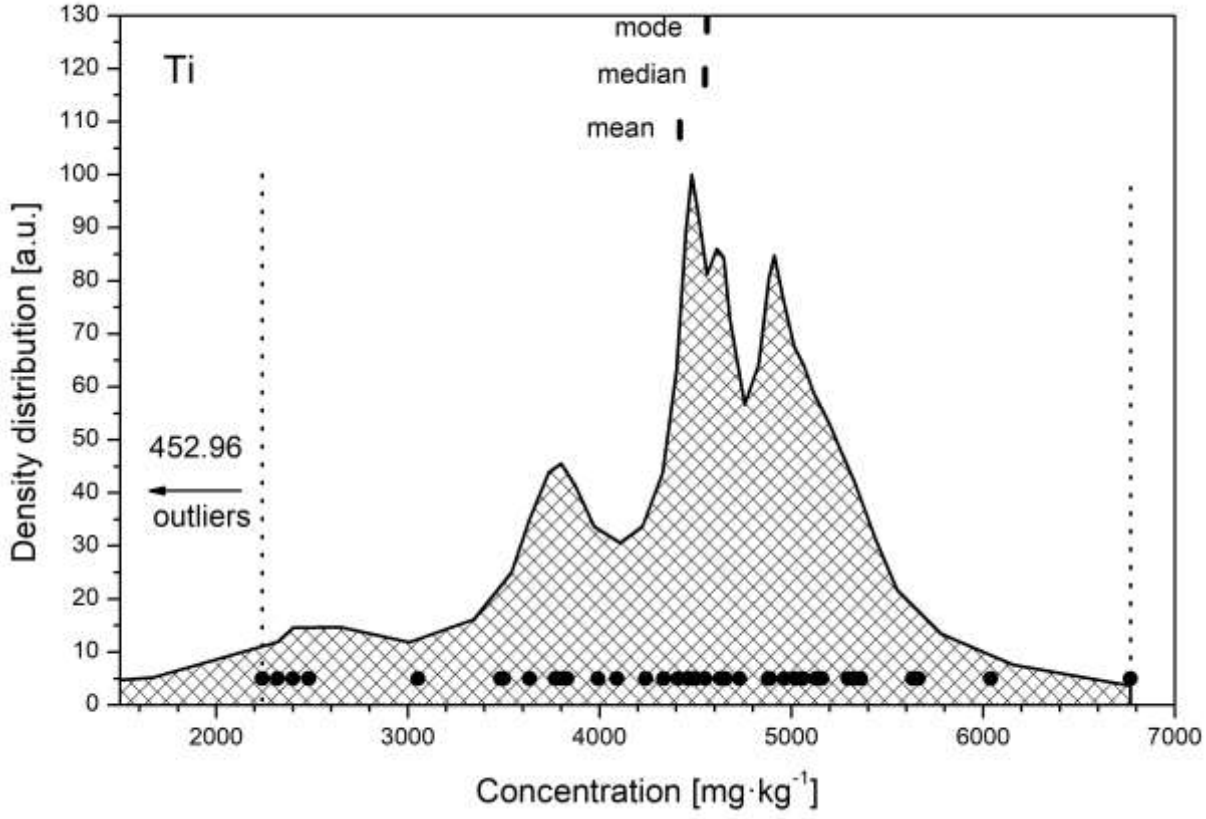

FIG. 30. The density distribution function for the analyte Ti.

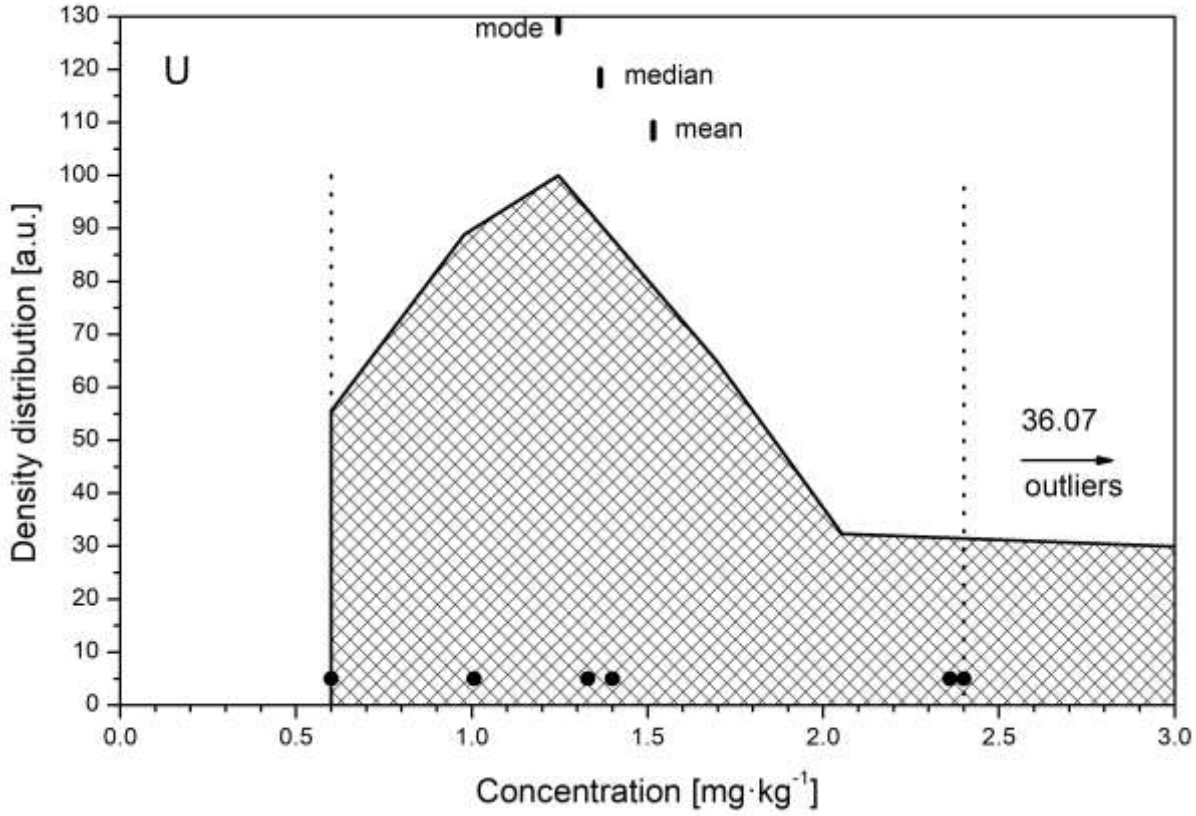

FIG. 31. The density distribution function for the analyte U.

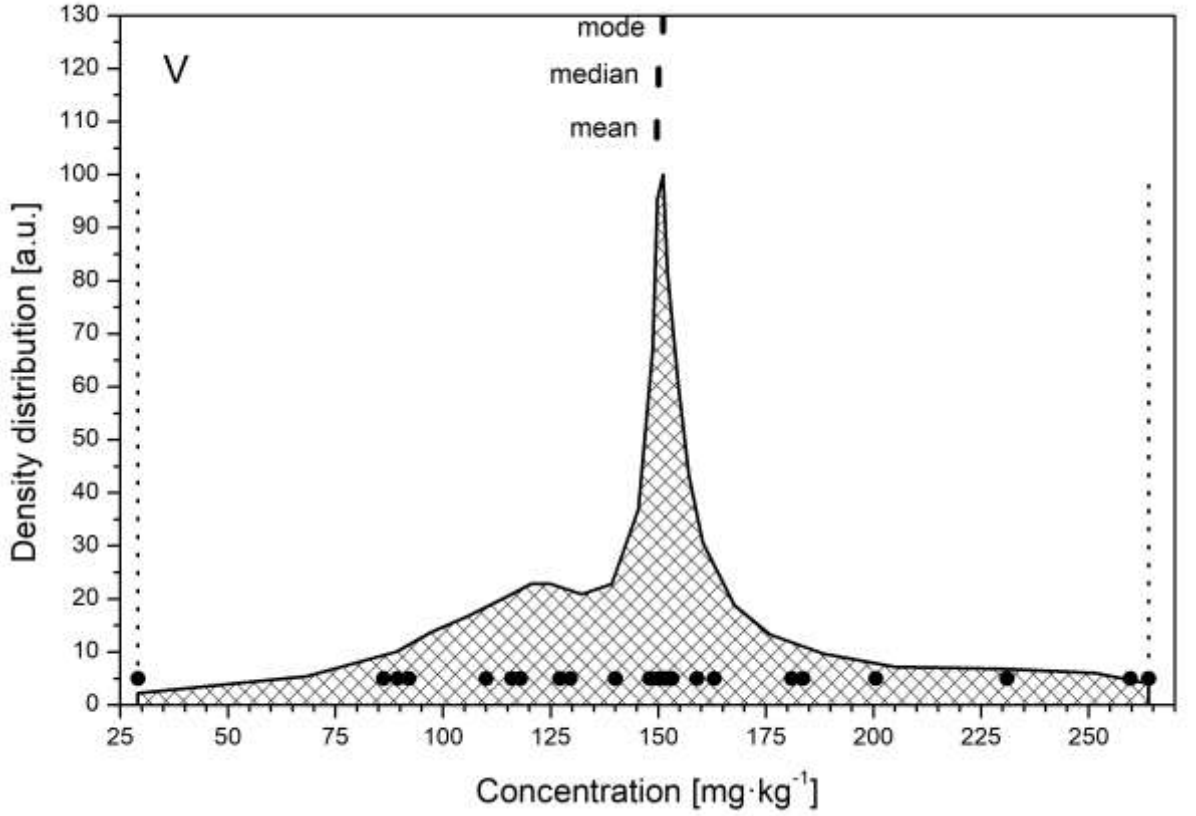

FIG. 32. The density distribution function for the analyte V.

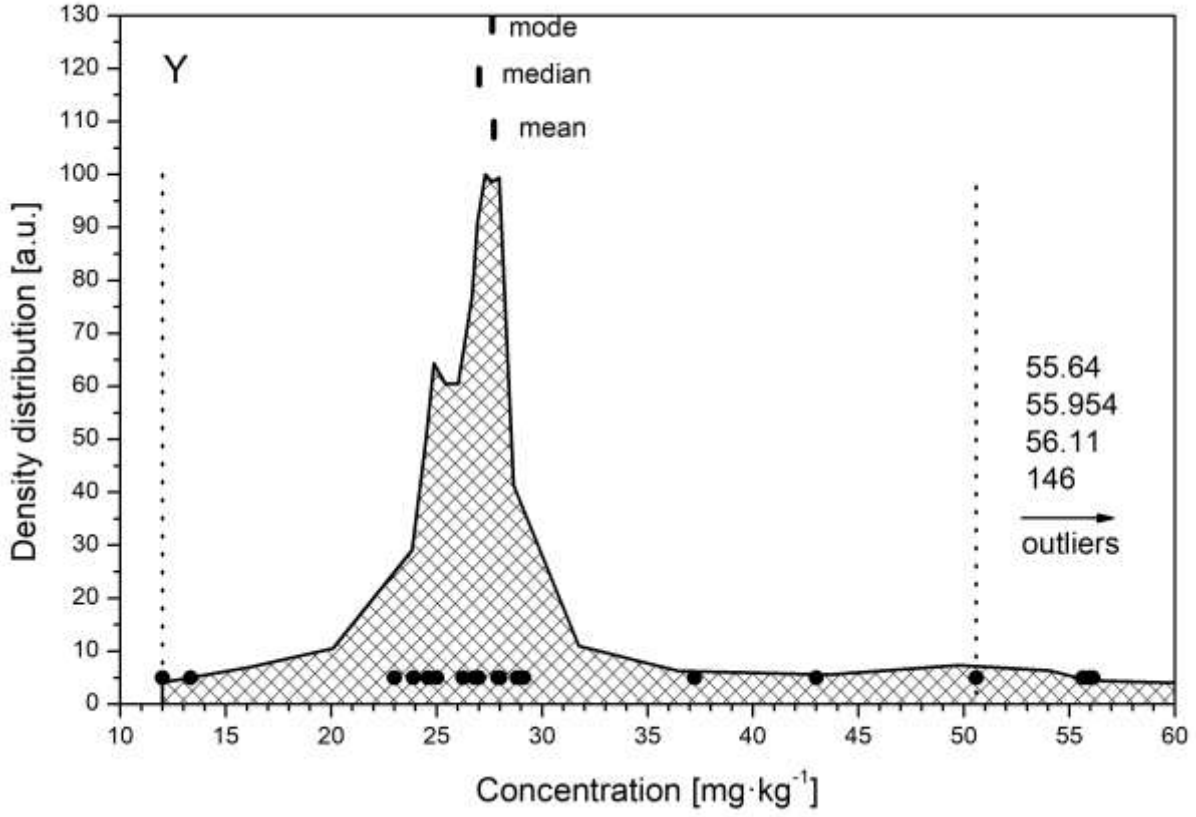

FIG. 33. The density distribution function for the analyte Y.

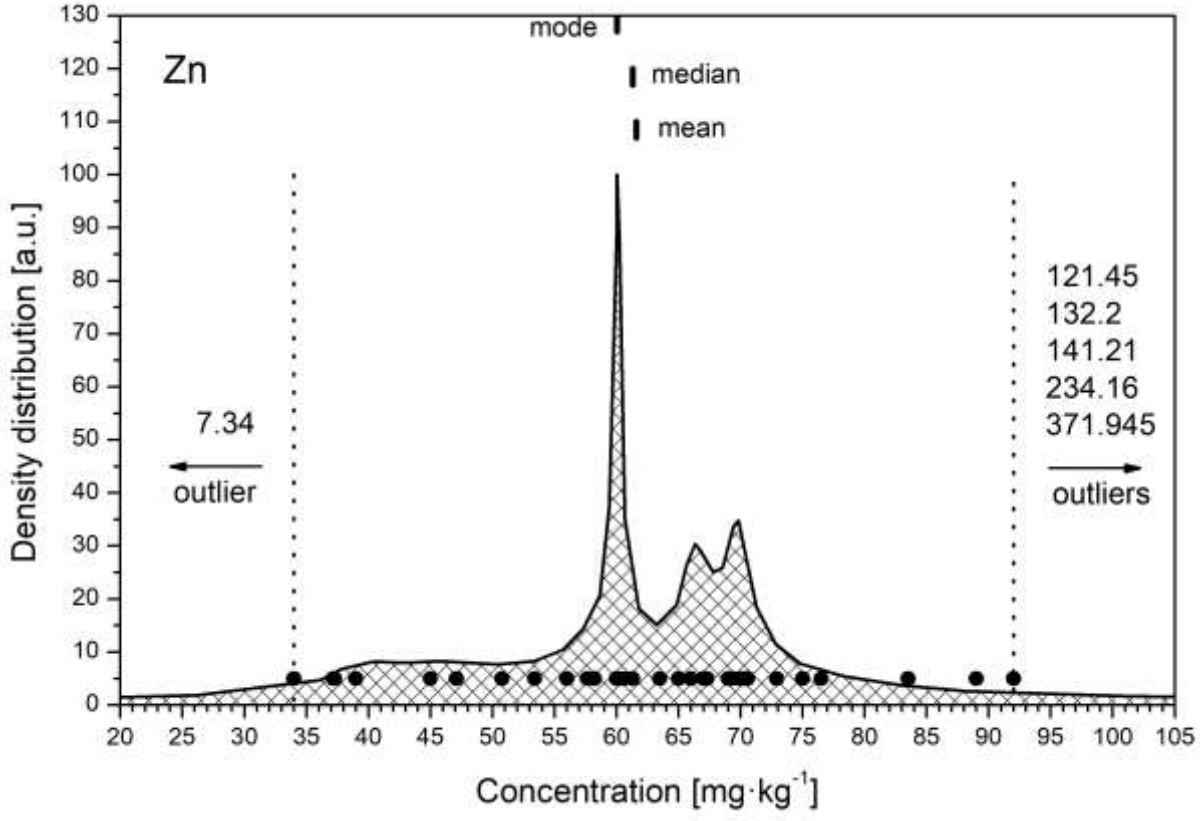

FIG. 34. The density distribution function for the analyte Zn.

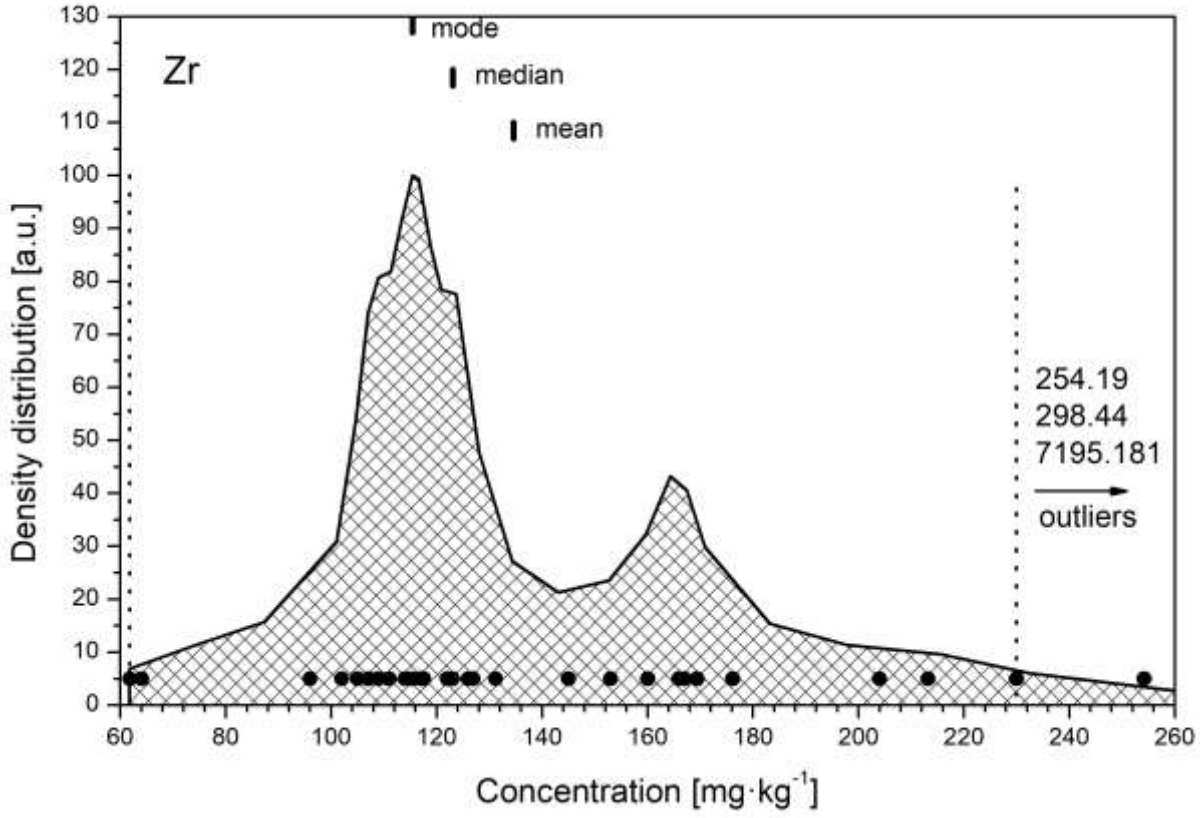

FIG. 35. The density distribution function for the analyte Zr.

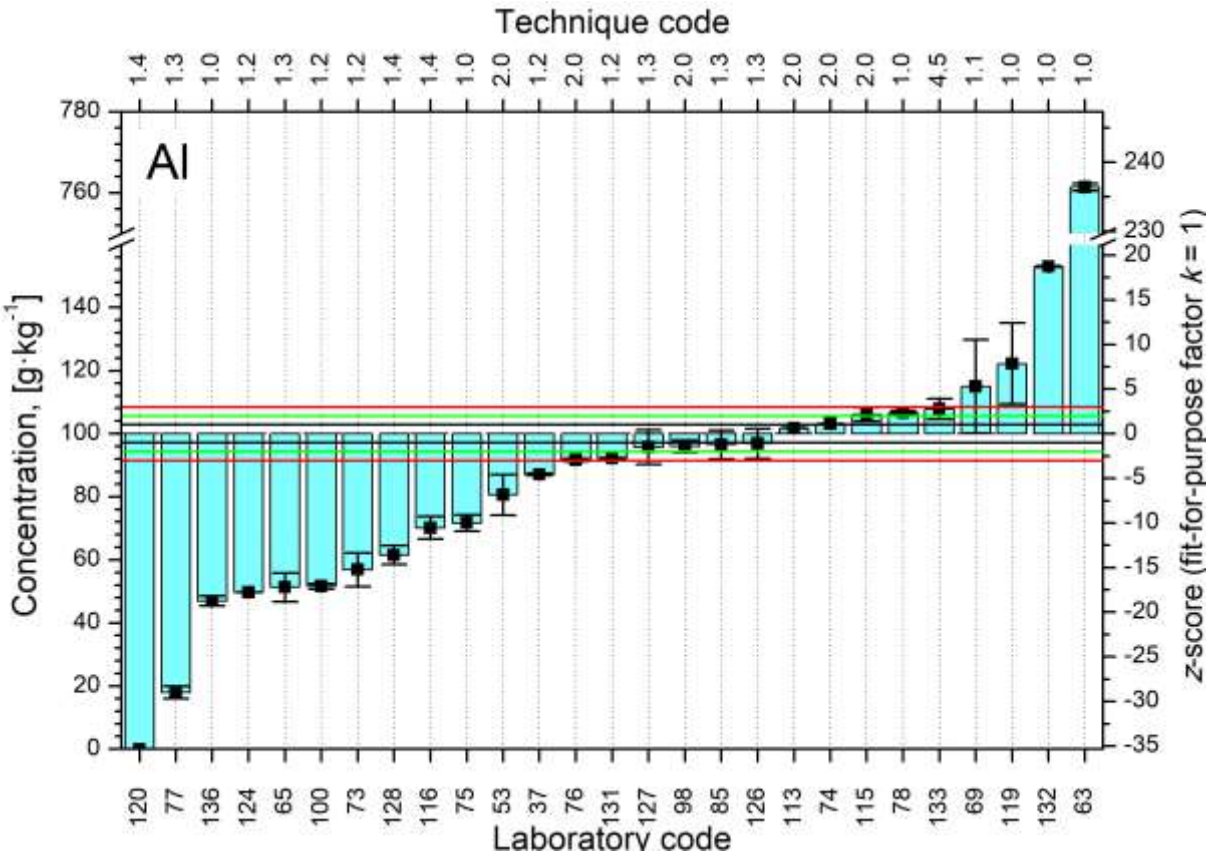

FIG. 36. Distributions of z-scores for analyte Al.

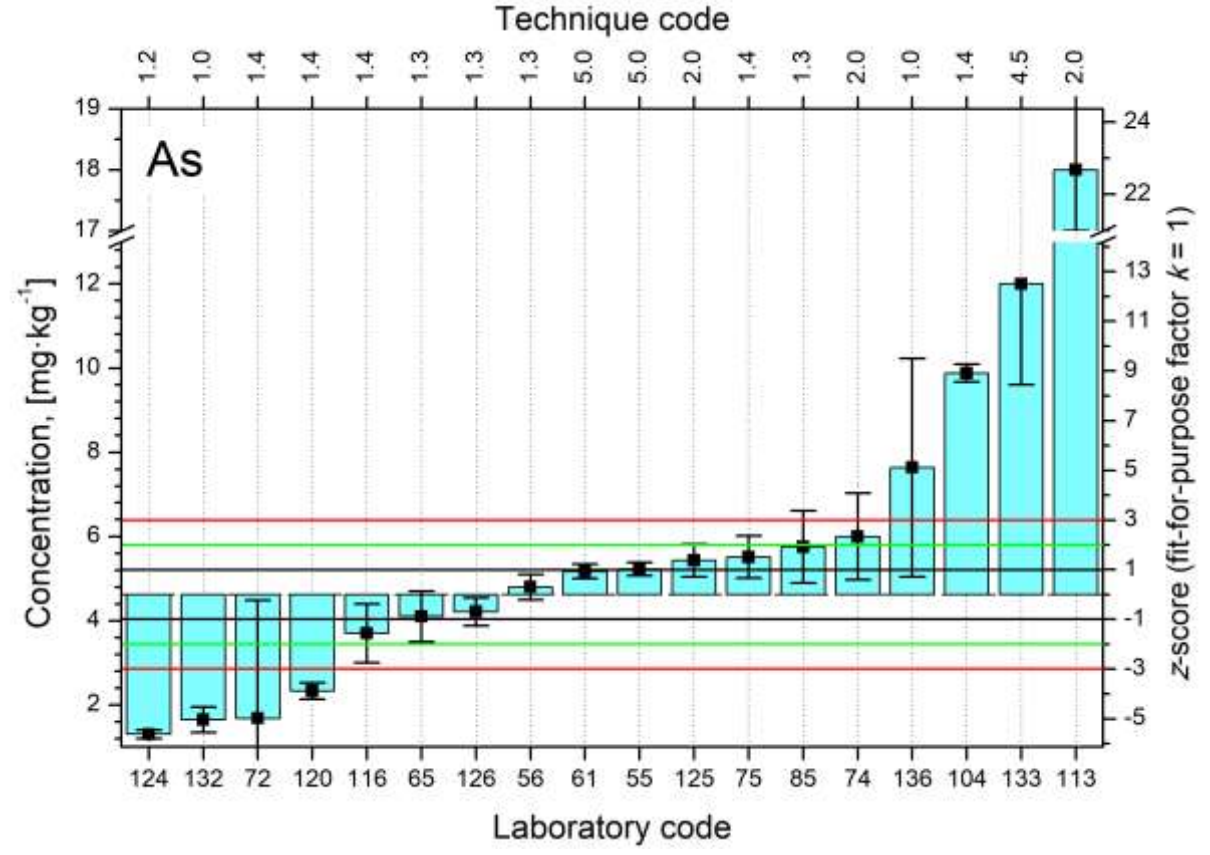

FIG. 37. Distributions of z-scores for analyte As.

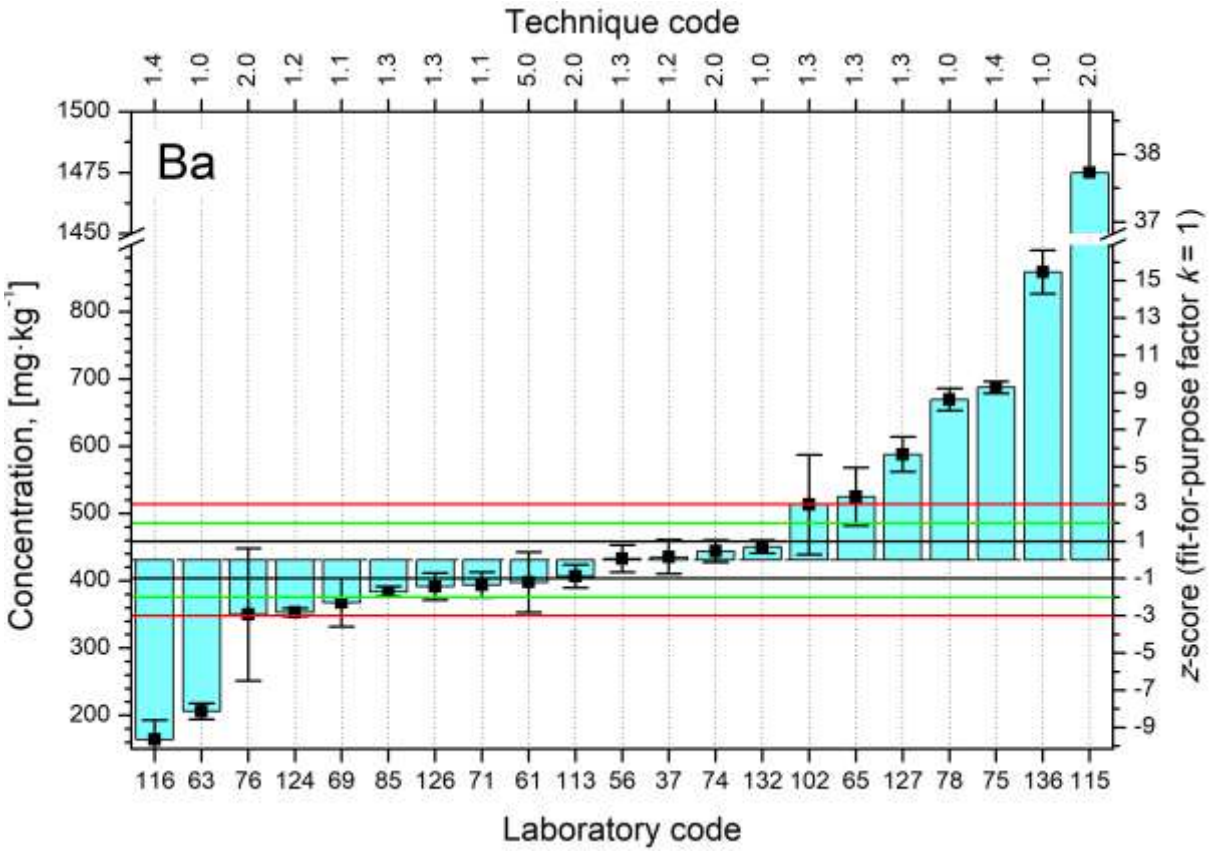

FIG. 38. Distributions of z-scores for analyte Ba.

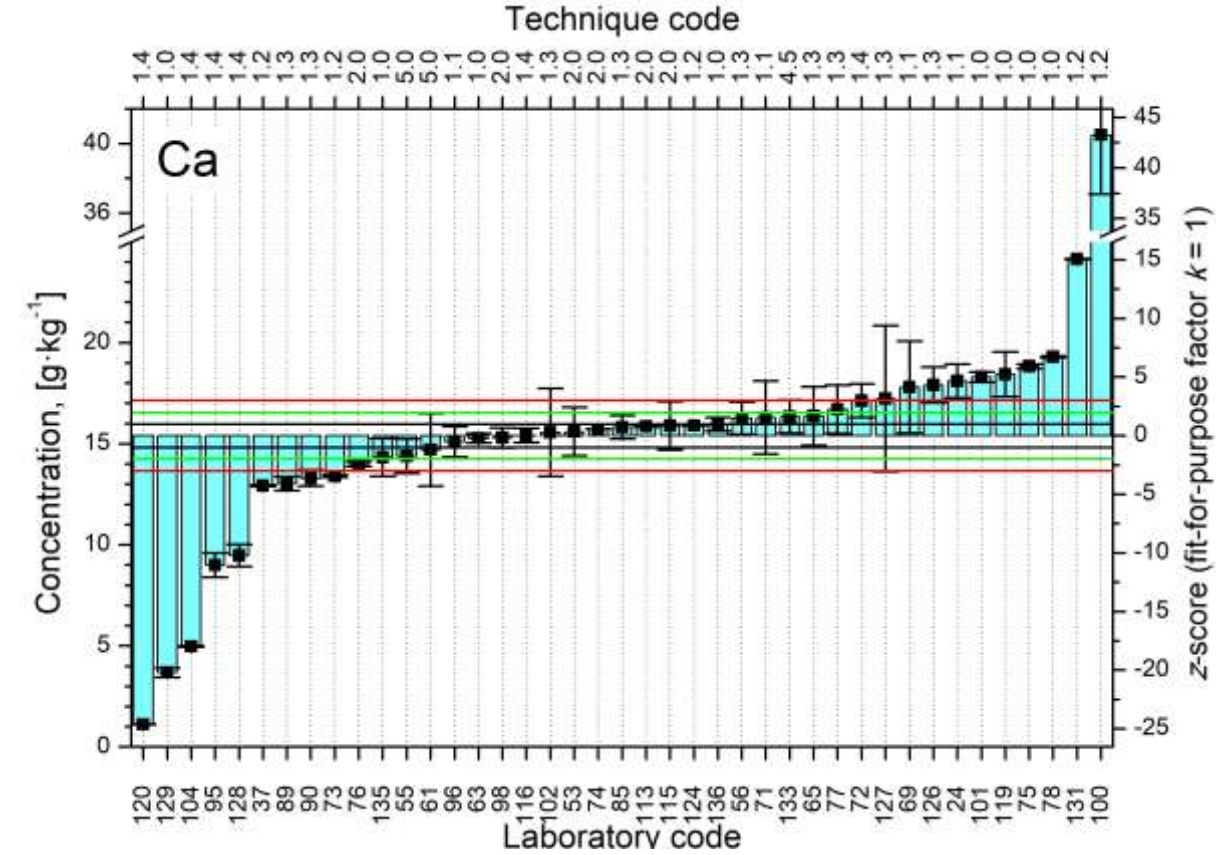

FIG. 39. Distributions of z-scores for analyte Ca.

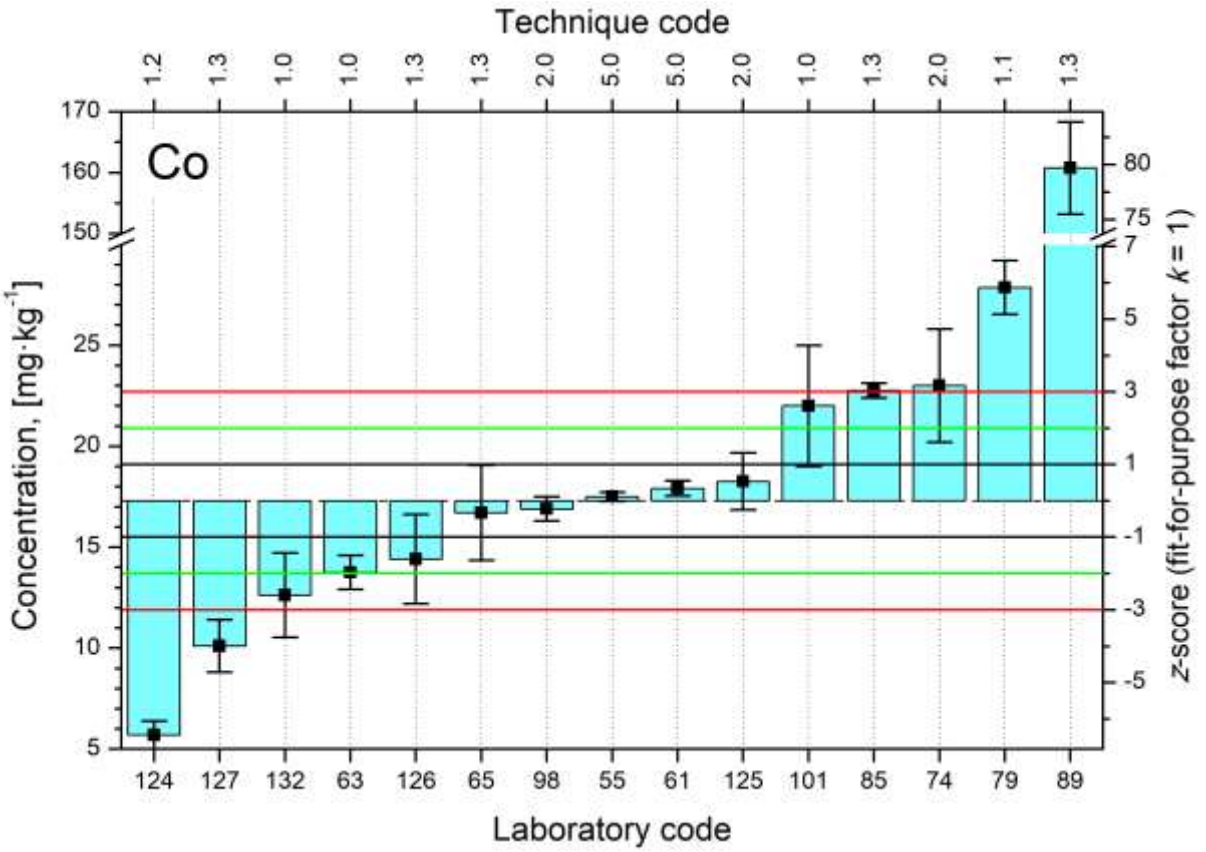

FIG. 40. Distributions of z-scores for analyte Co.

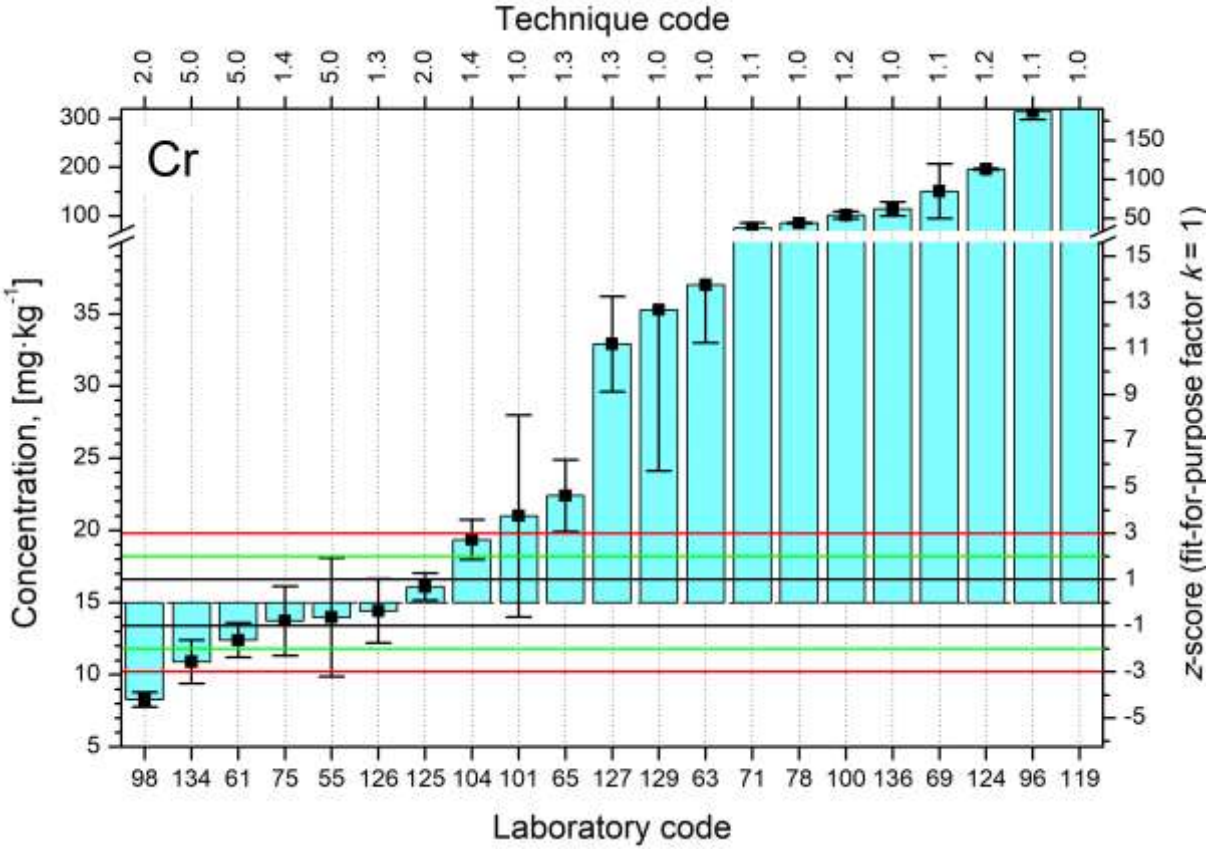

FIG. 41. Distributions of z-scores for analyte Cr.

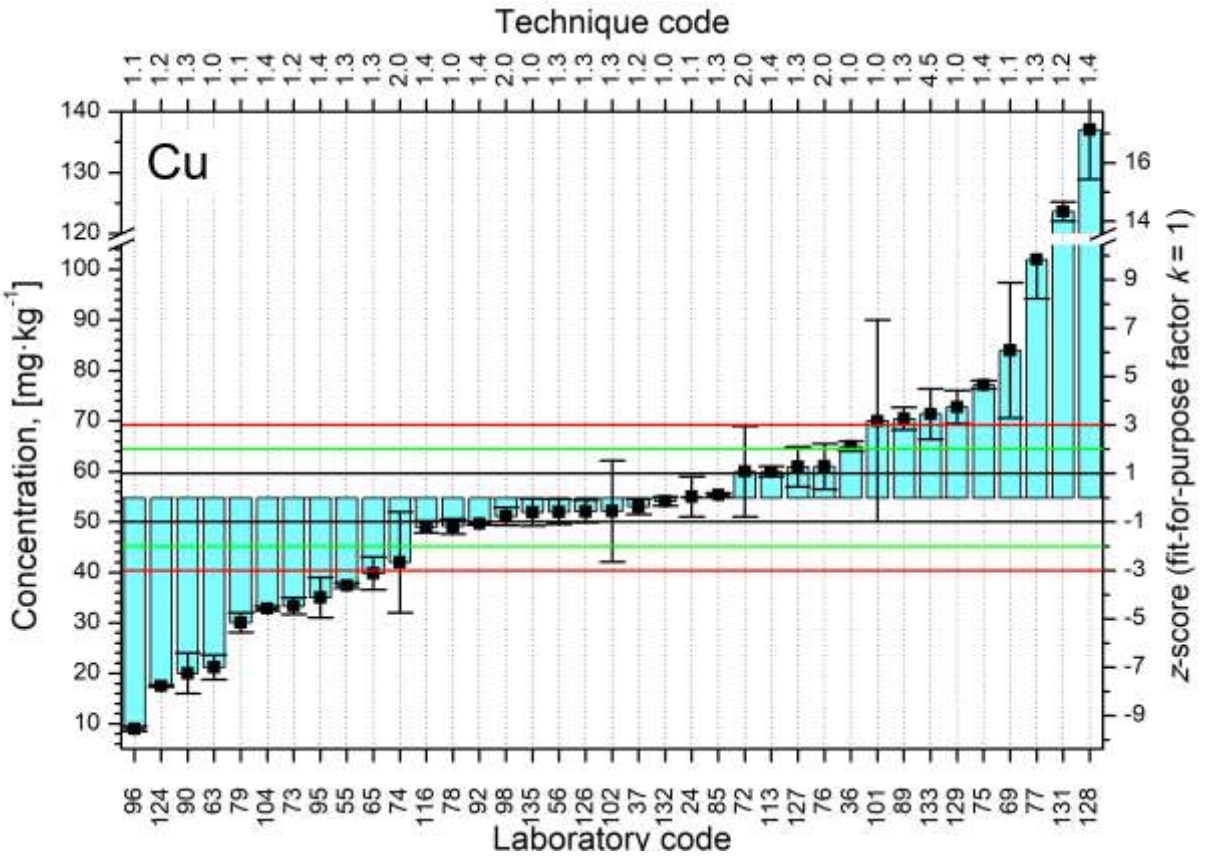

FIG. 42. Distributions of z-scores for analyte Cu.

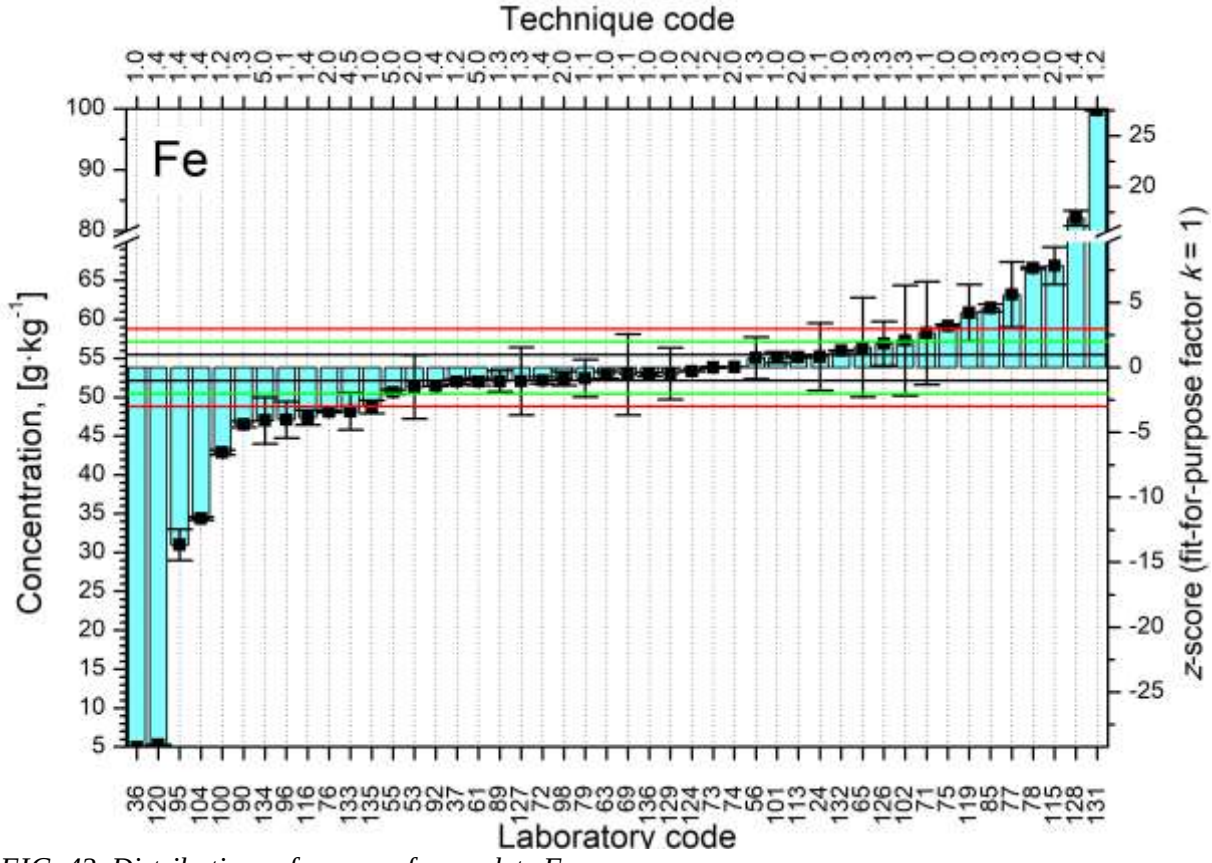

FIG. 43. Distributions of z-scores for analyte Fe.

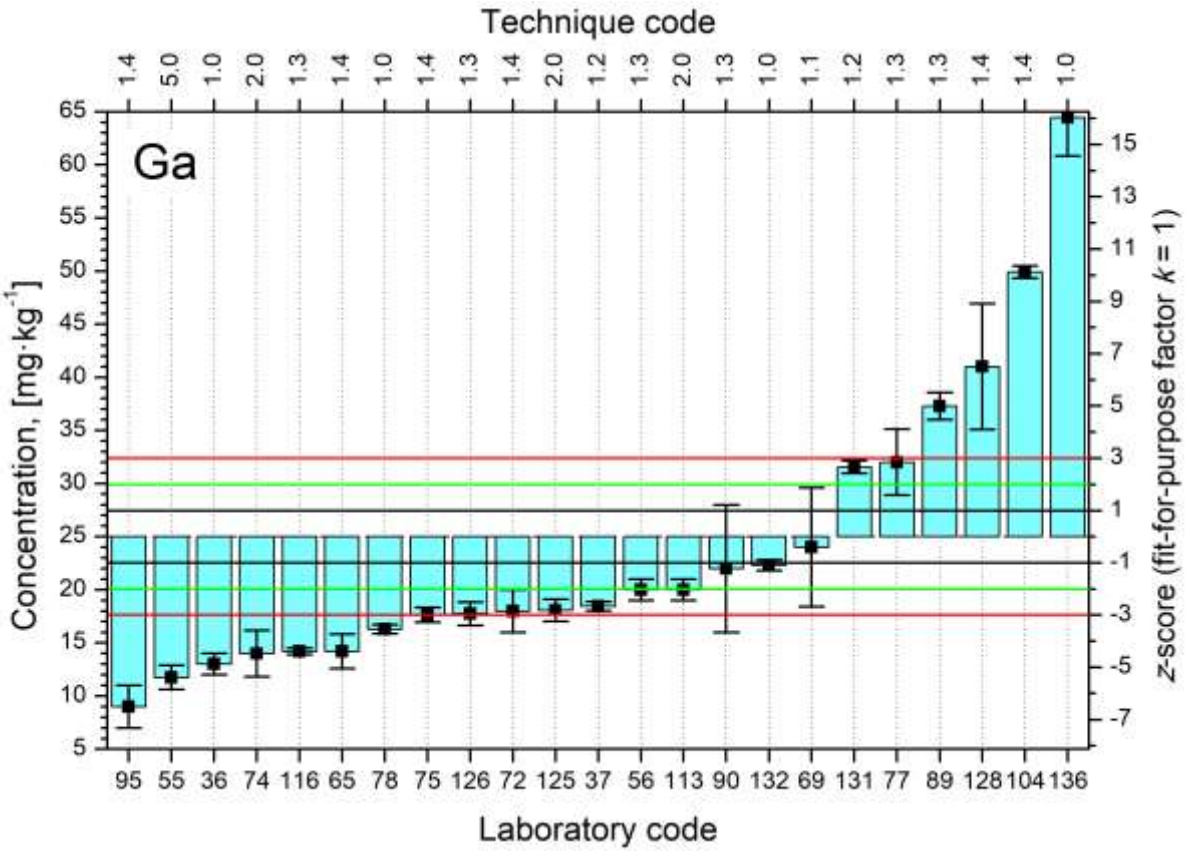

FIG. 44. Distributions of z-scores for analyte Ga.

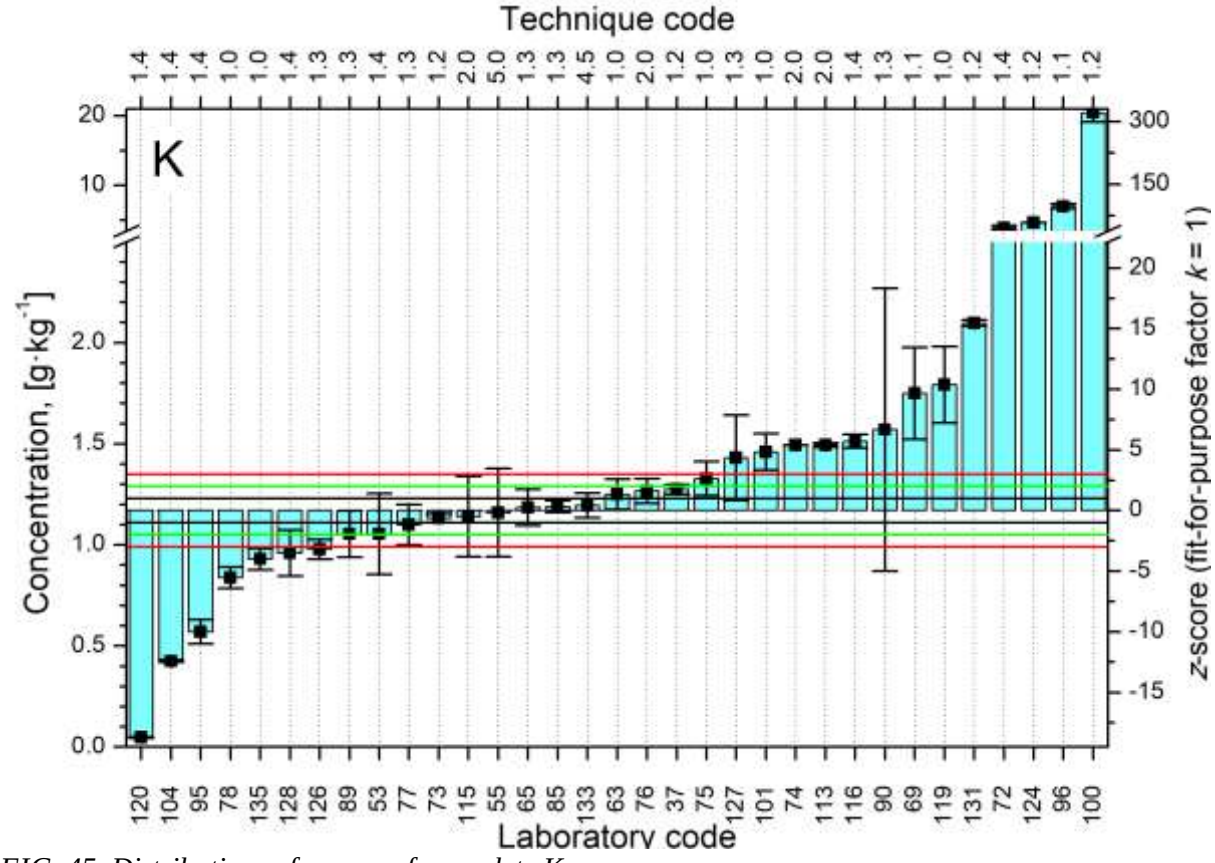

FIG. 45. Distributions of z-scores for analyte K.

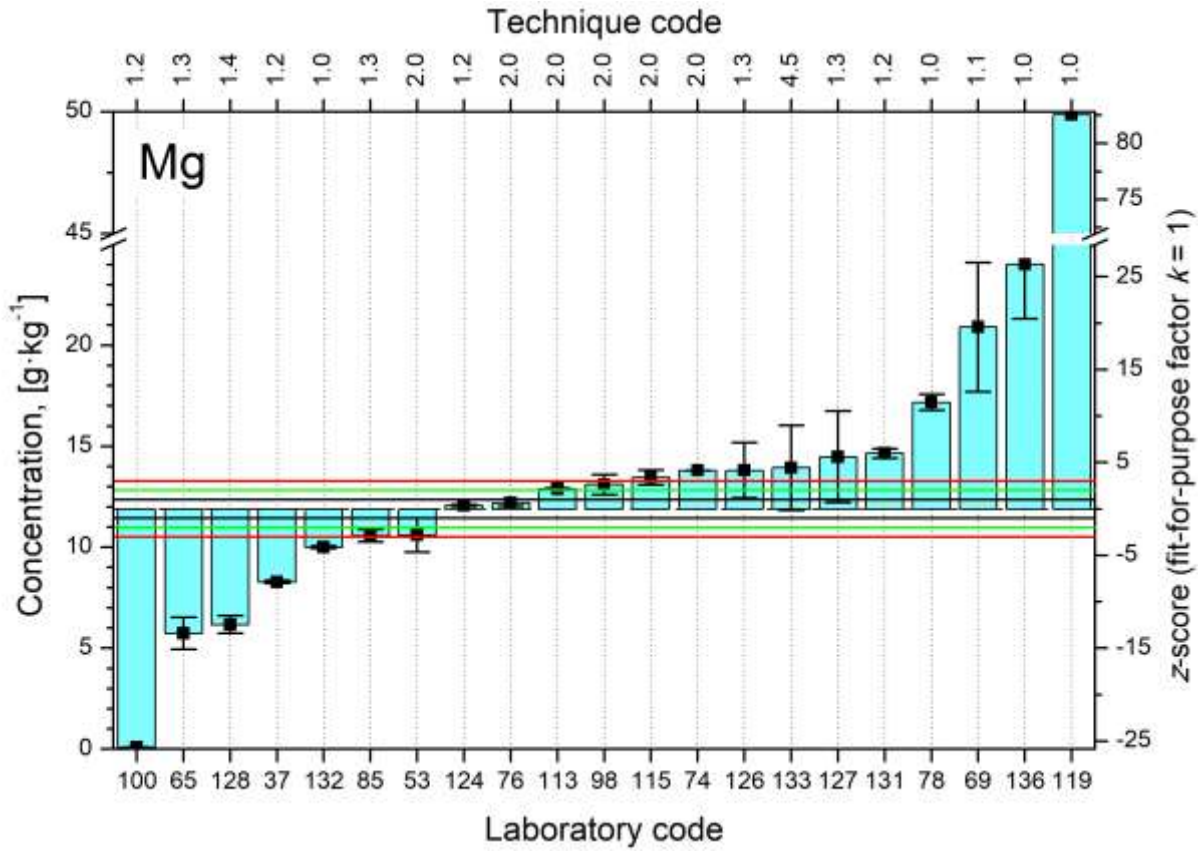

FIG. 46. Distributions of z-scores for analyte Mg.

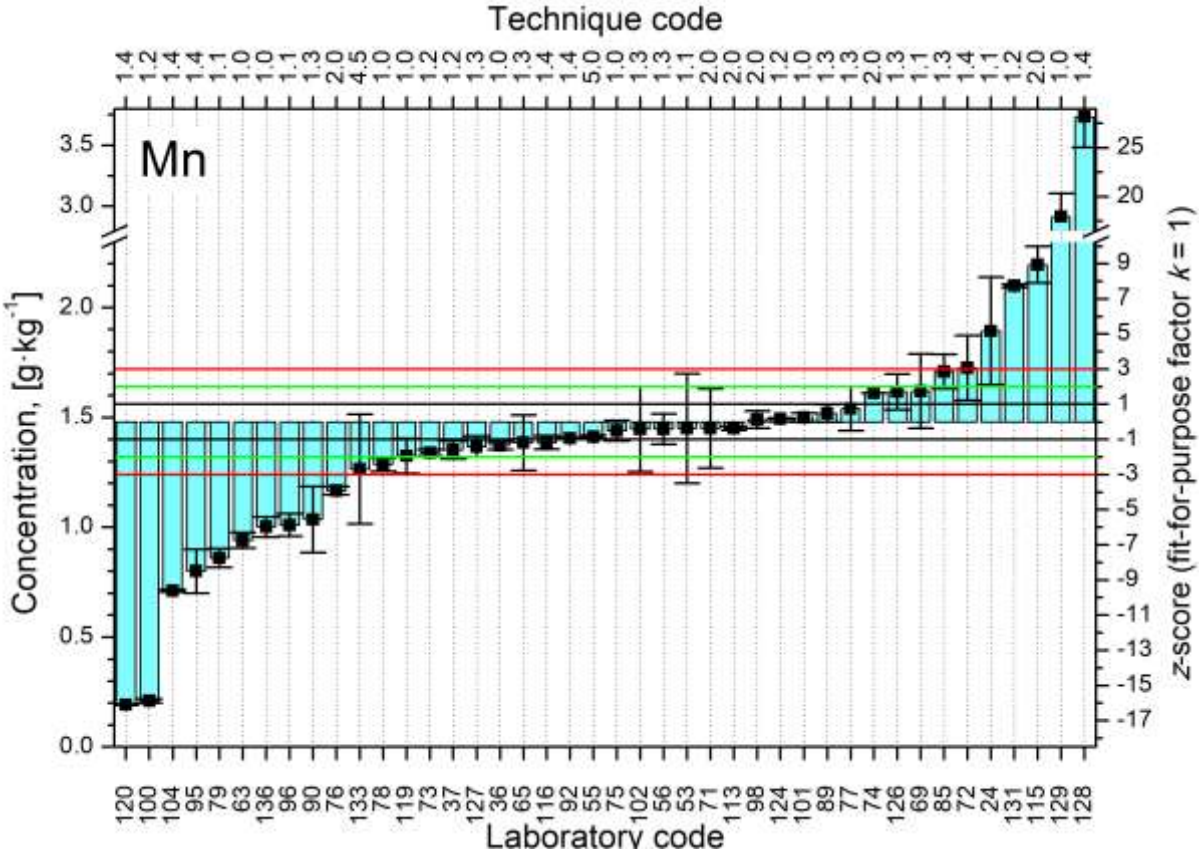

FIG. 47. Distributions of z-scores for analyte Mn.

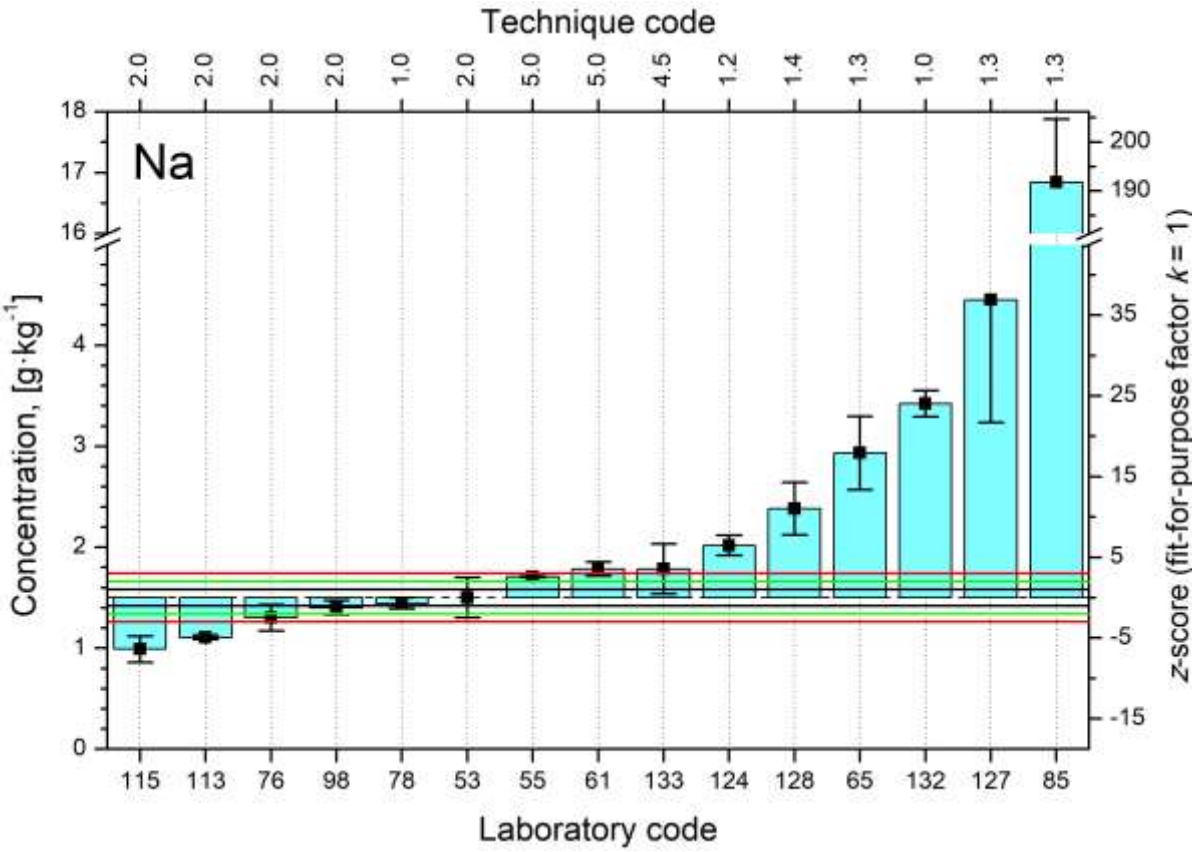

FIG. 48. Distributions of z-scores for analyte Na.

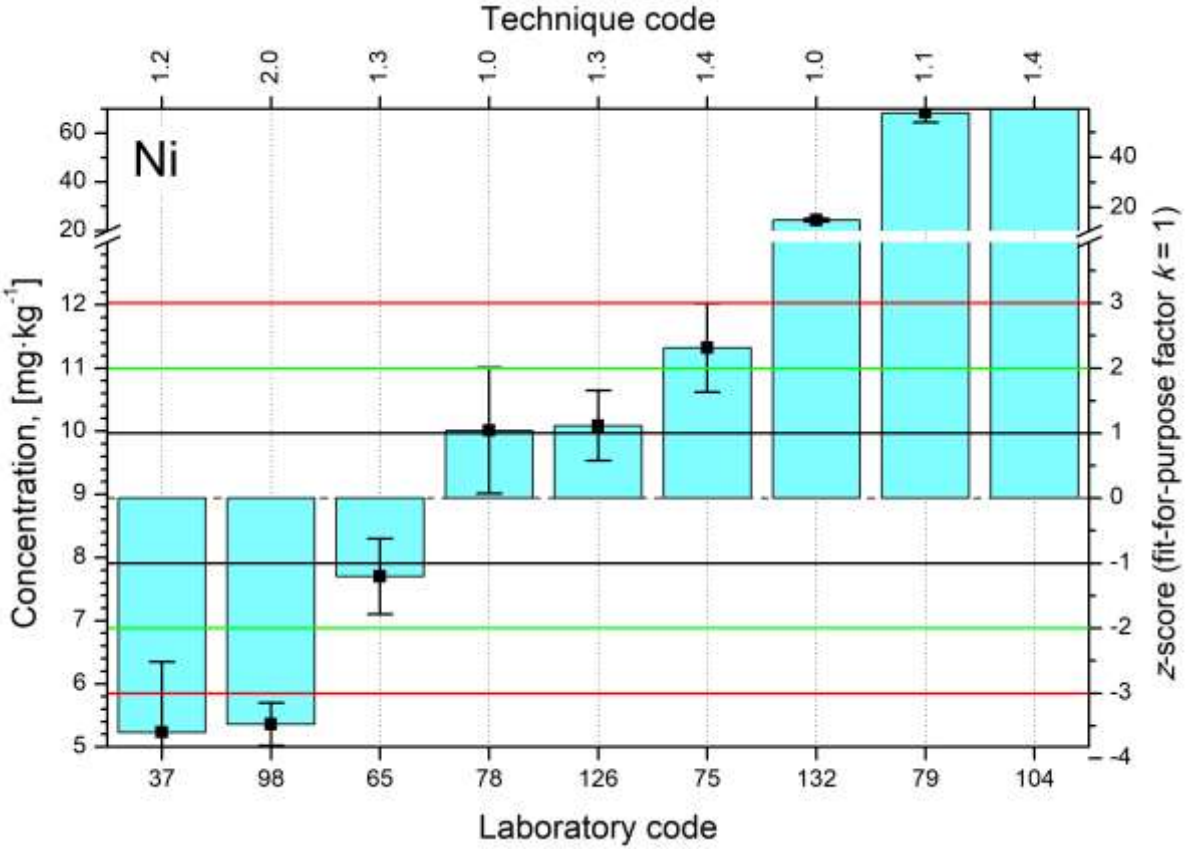

FIG. 49. Distributions of z-scores for analyte Ni.

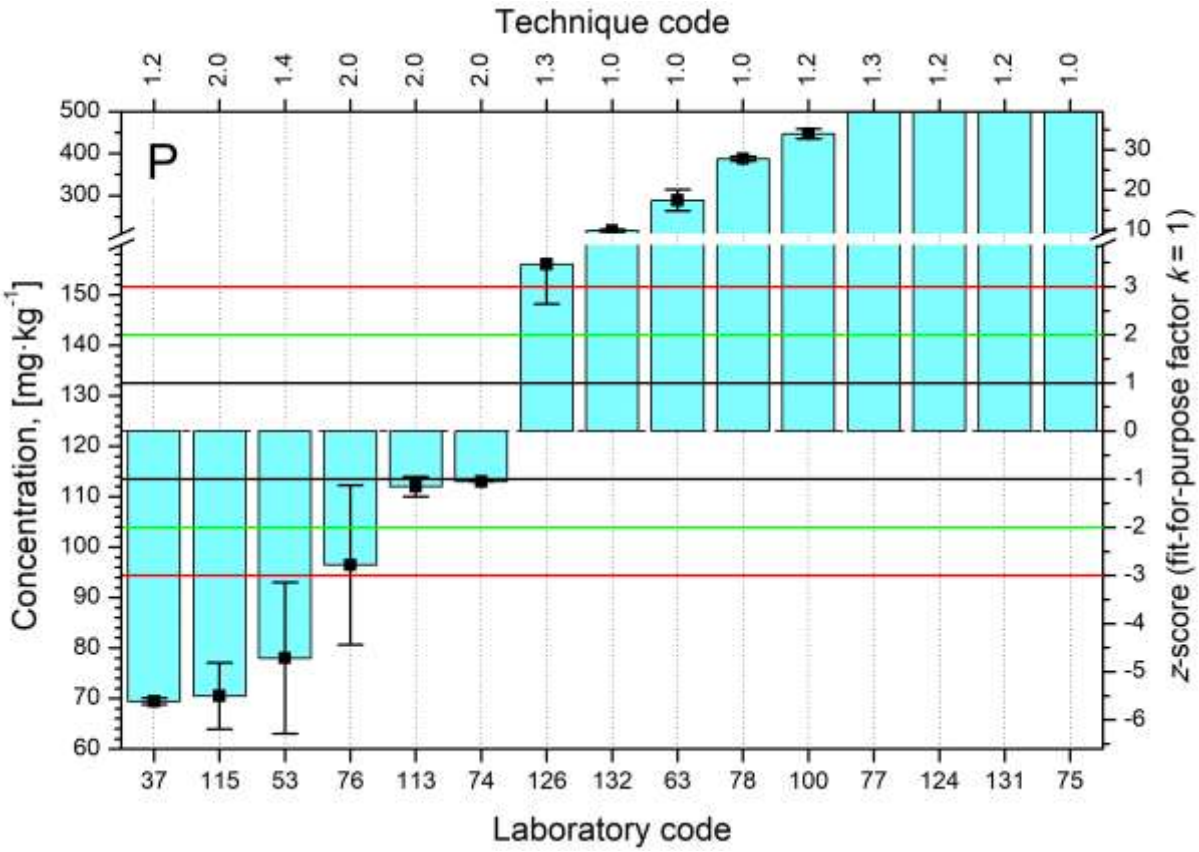

FIG. 50. Distributions of z-scores for analyte P.

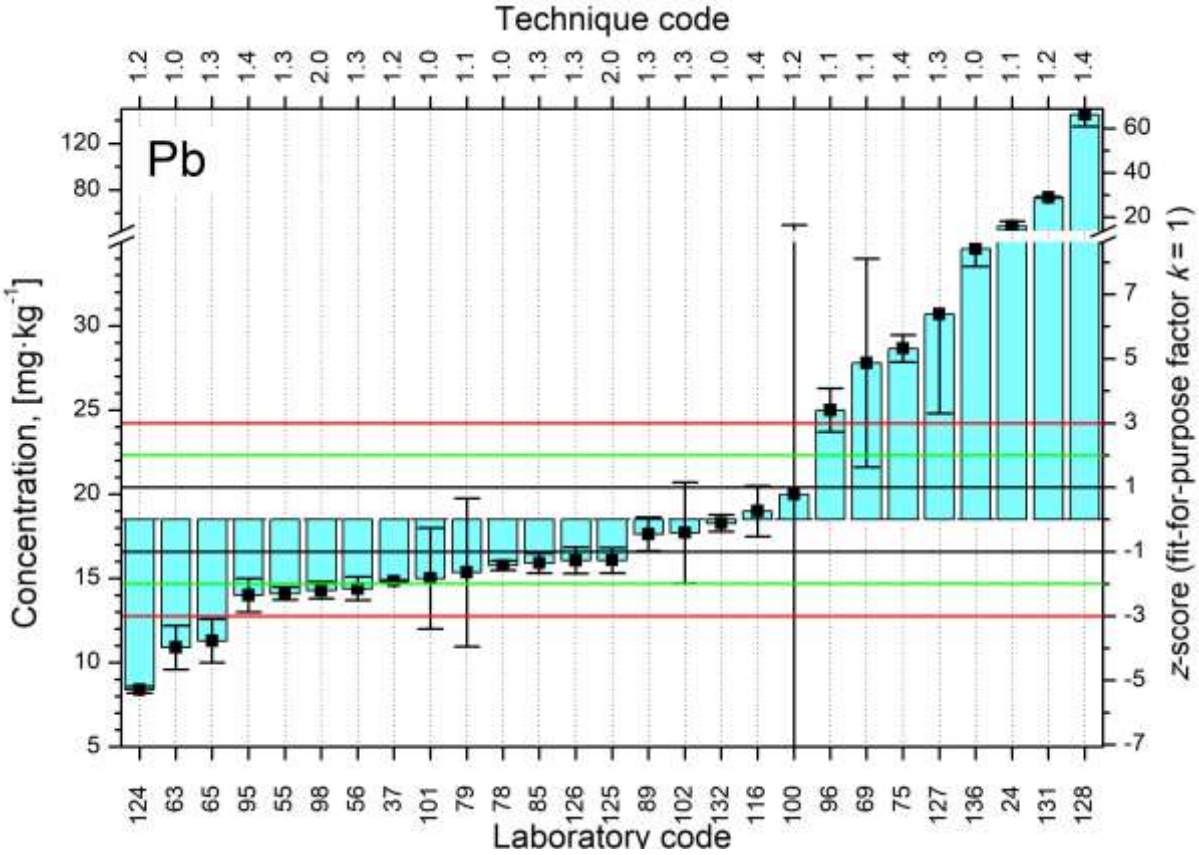

FIG. 51. Distributions of z-scores for analyte Pb.

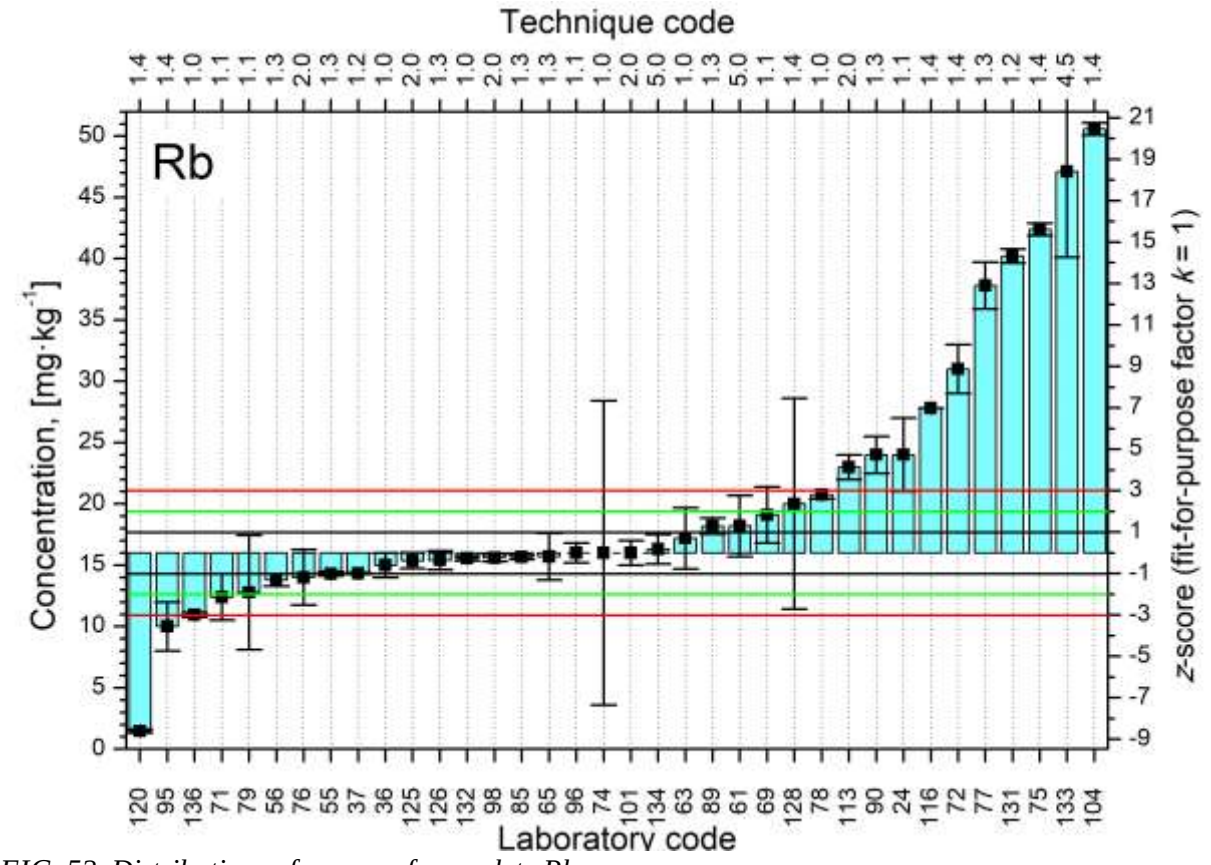

FIG. 52. Distributions of z-scores for analyte Rb.

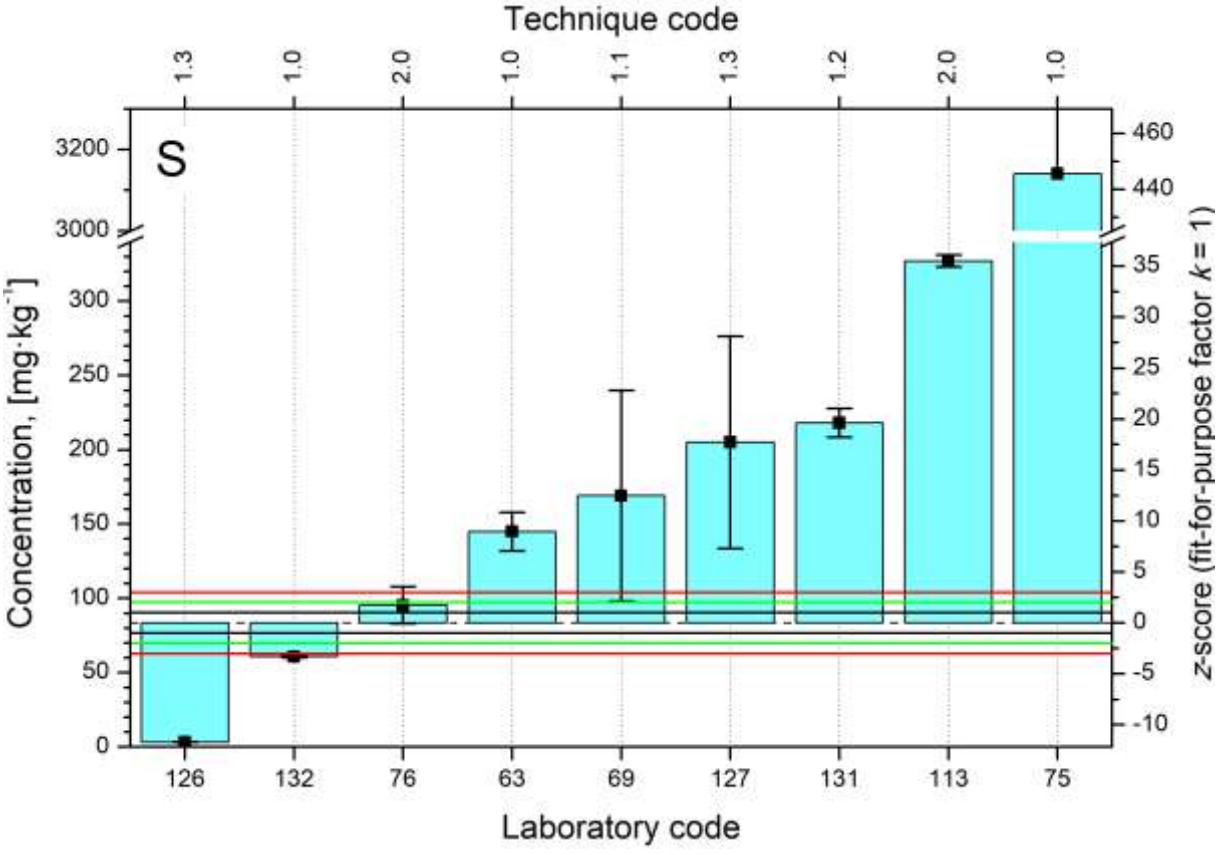

FIG. 53. Distributions of z-scores for analyte S.

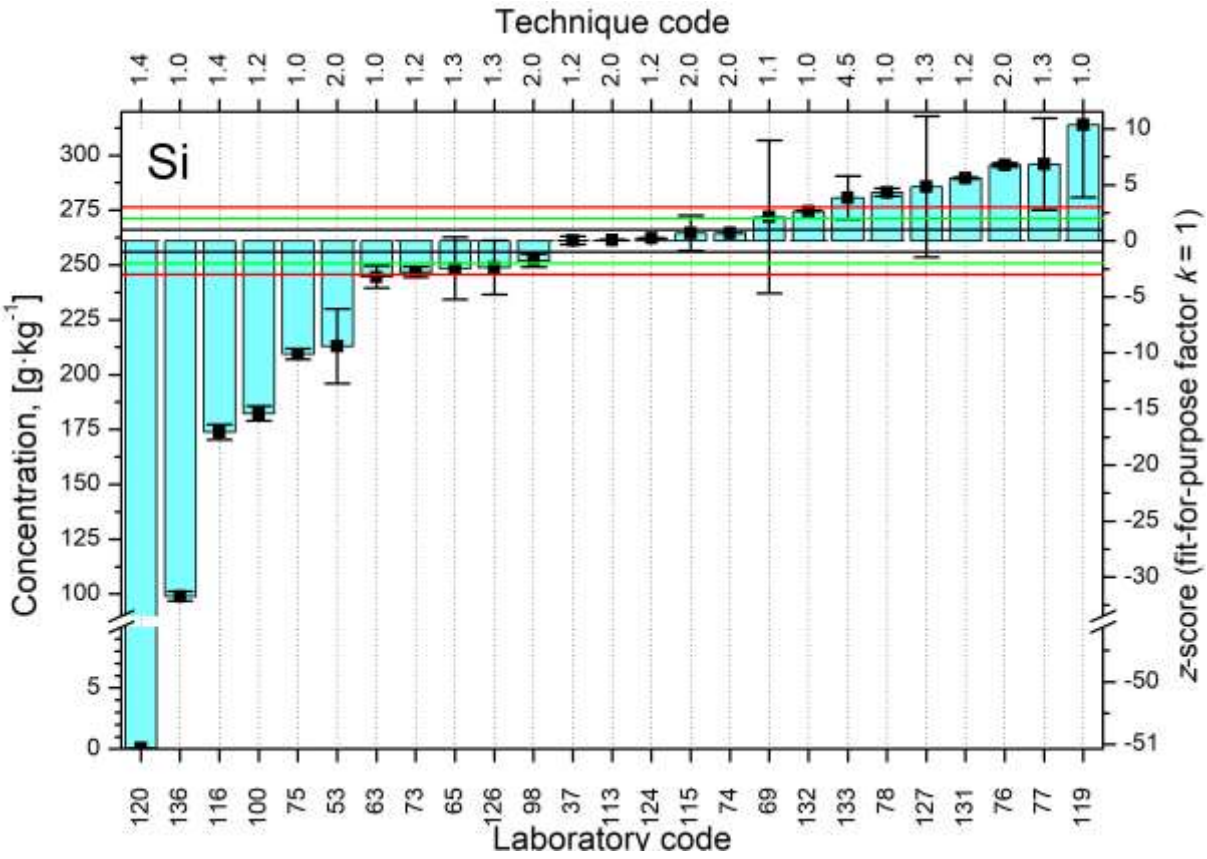

FIG. 54. Distributions of z-scores for analyte Si.

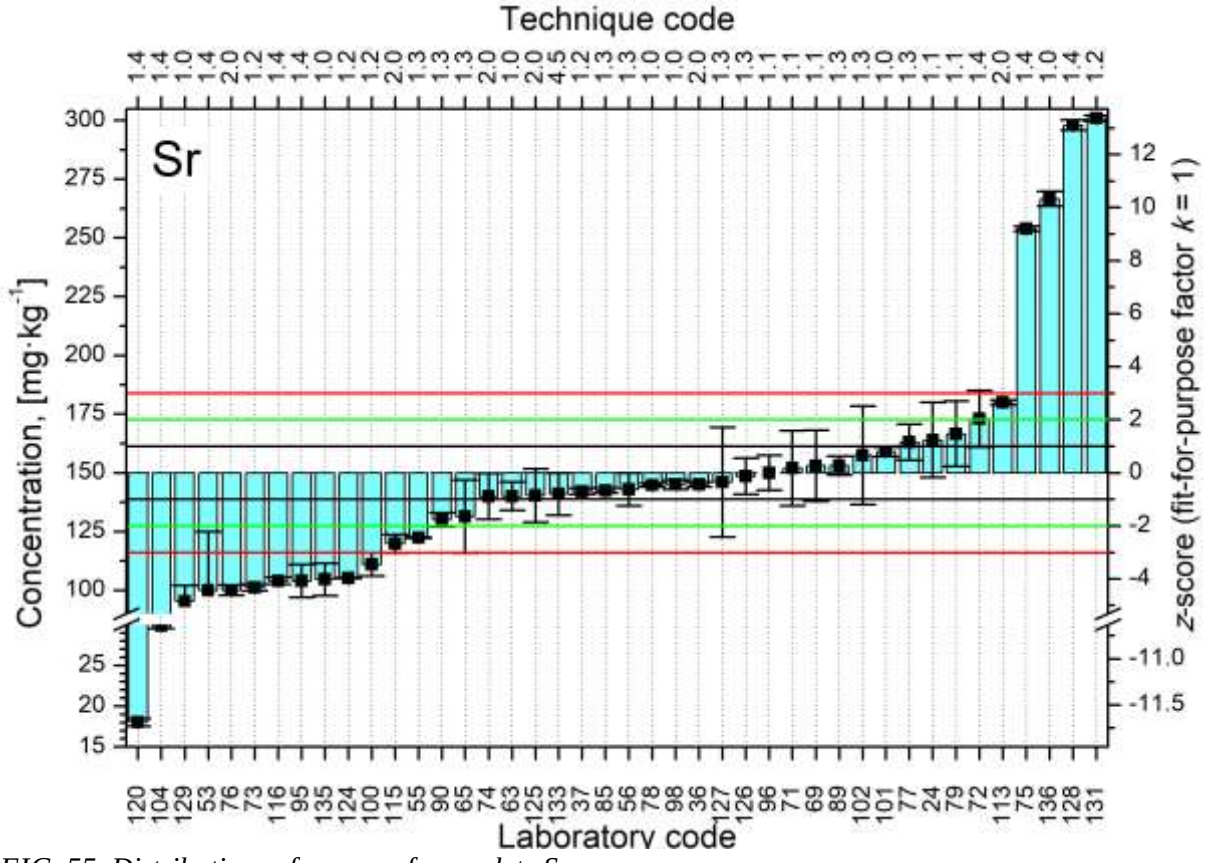

FIG. 55. Distributions of z-scores for analyte Sr.

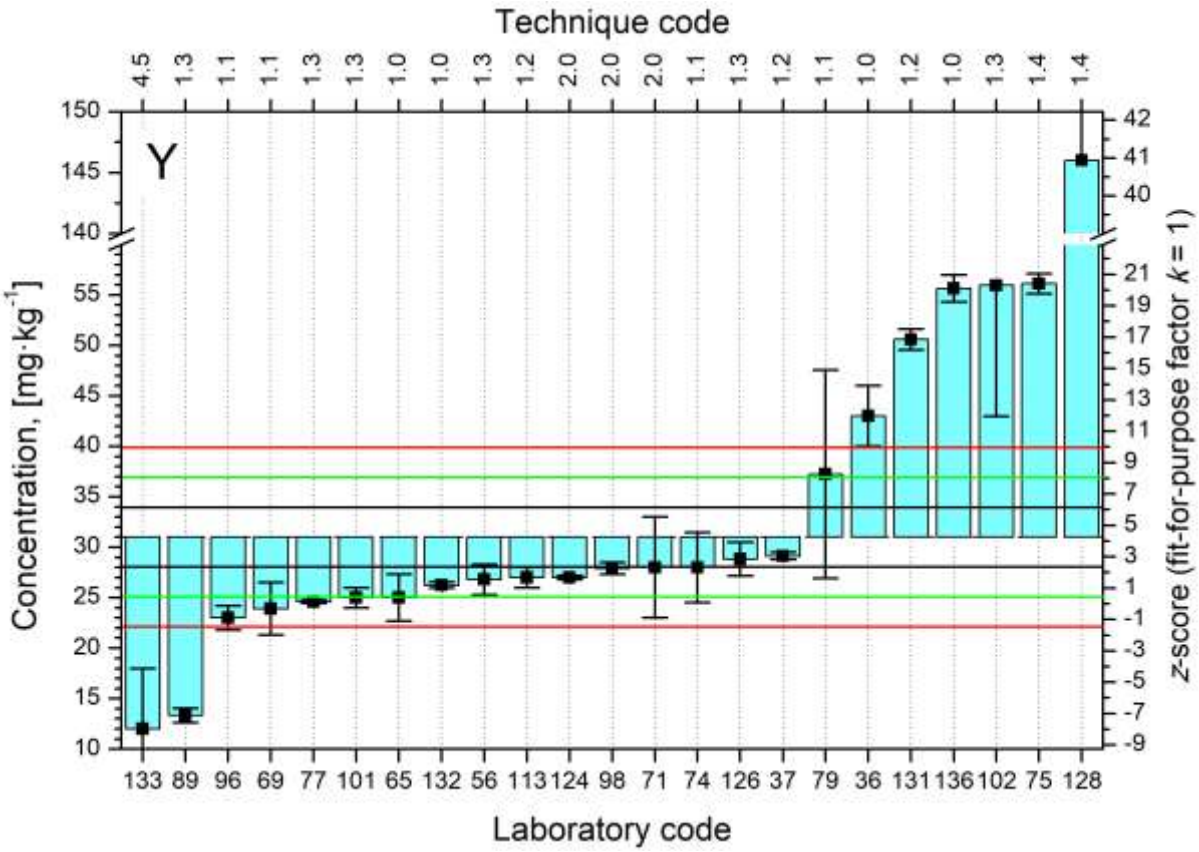

FIG. 56. Distributions of z-scores for analyte Y.

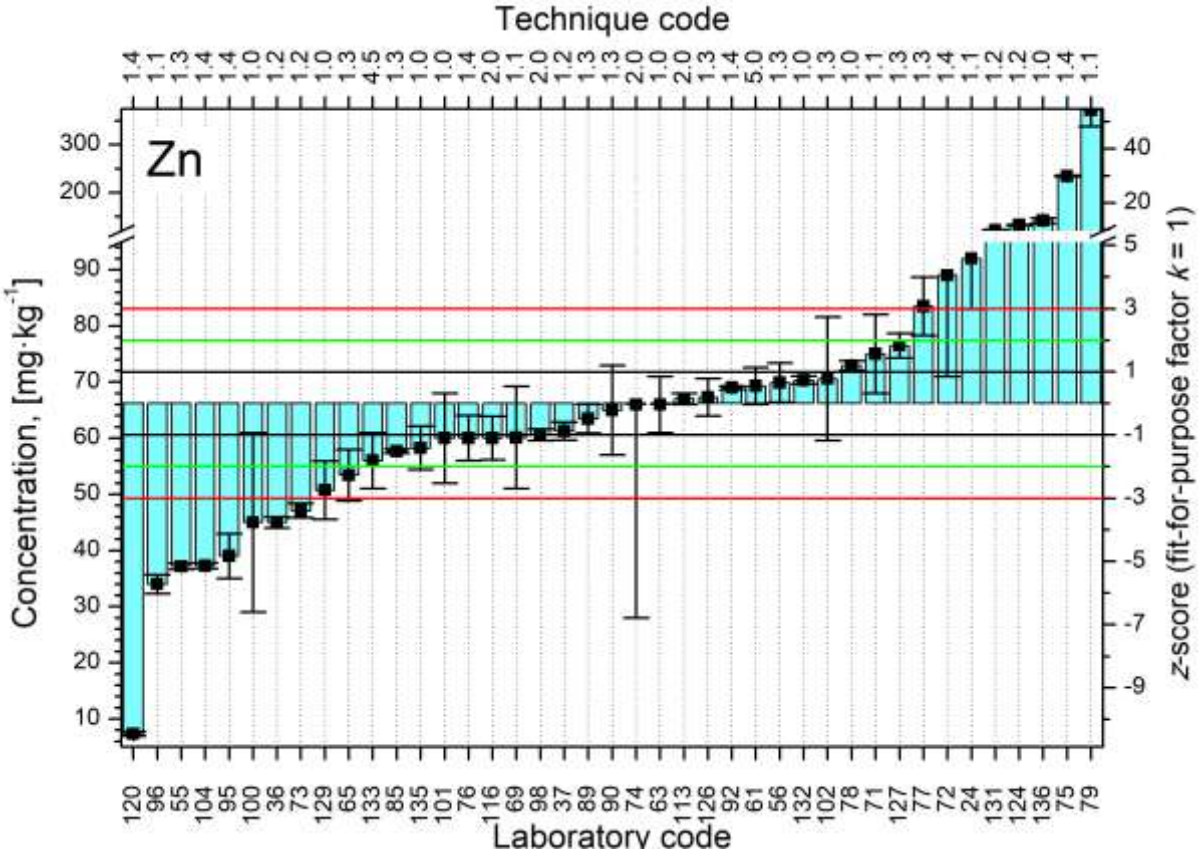

FIG. 57. Distributions of z-scores for analyte Zn.

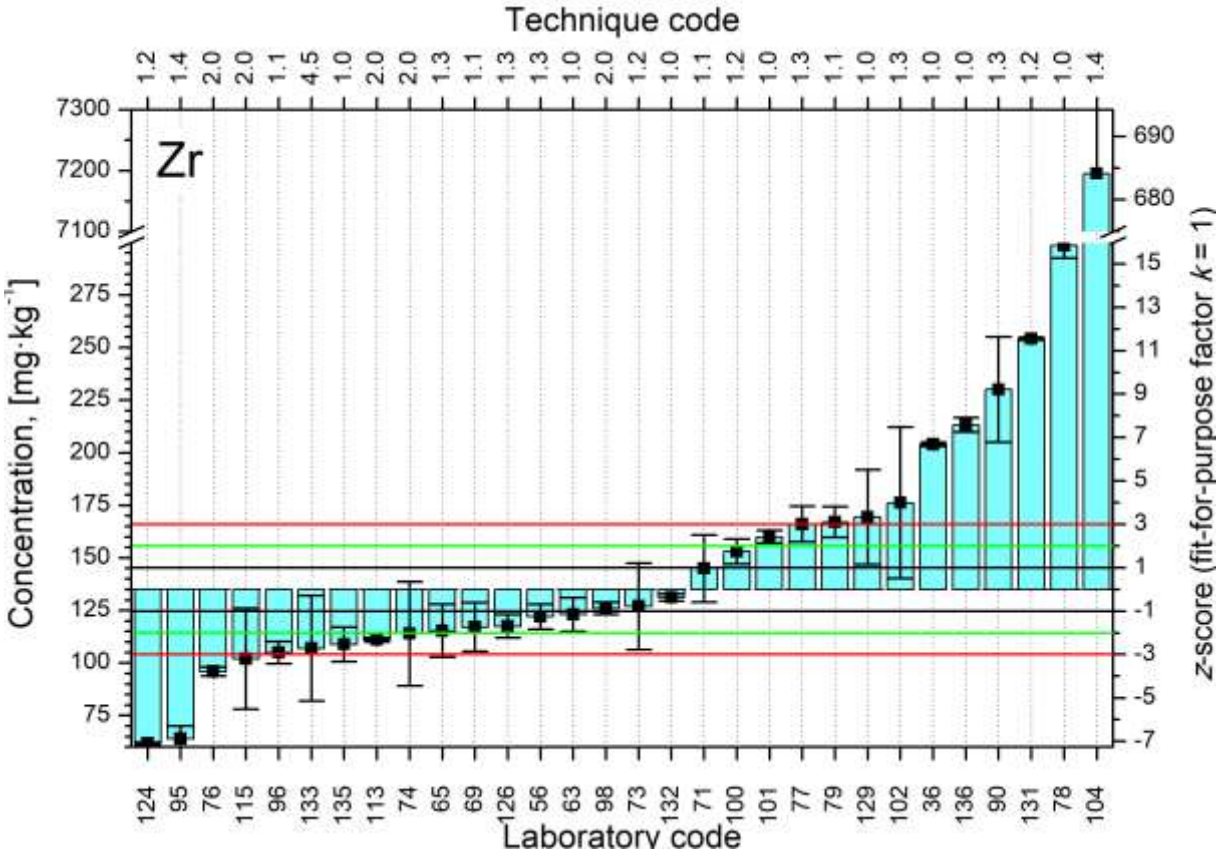

FIG. 58. Distributions of z-scores for analyte Zr.

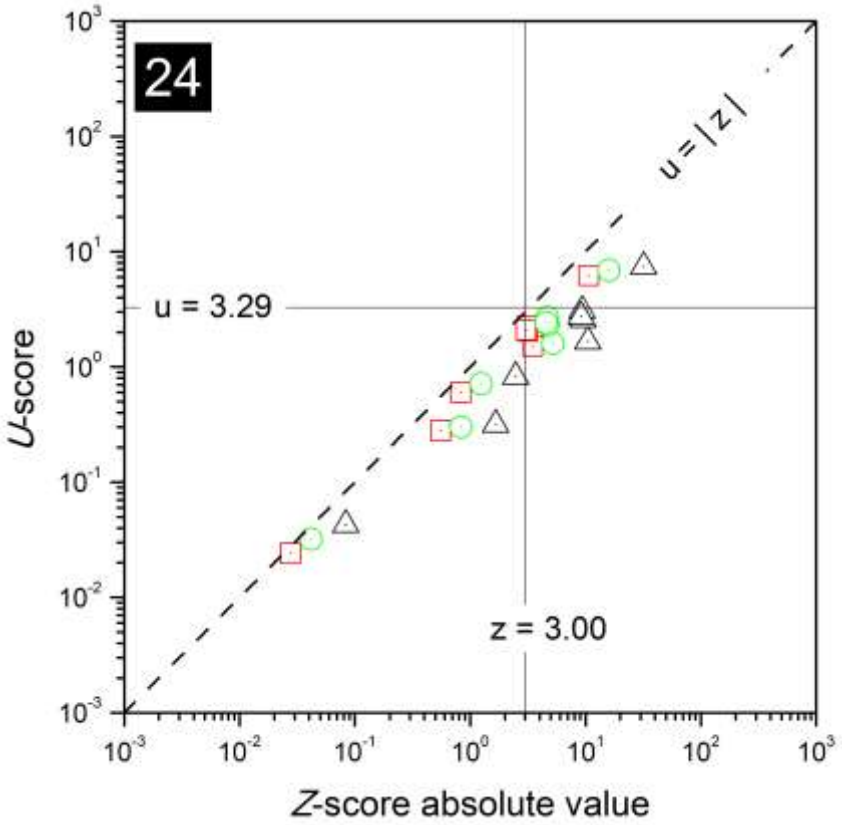

FIG. 59. Combined plots of z- and u-scores for the laboratory with code 24.

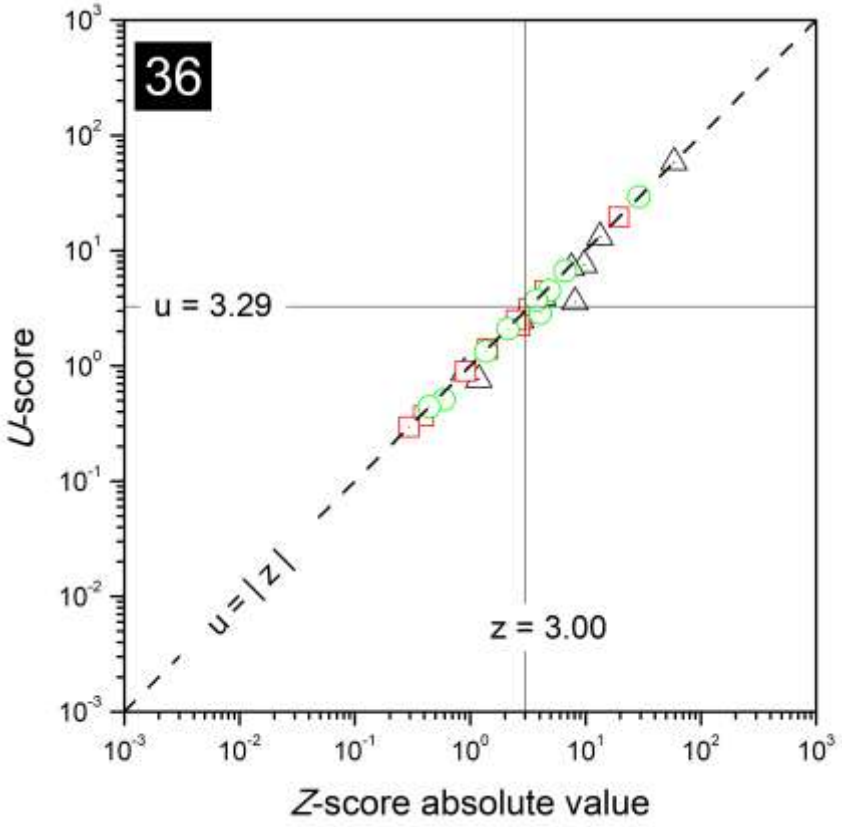

FIG. 60. Combined plots of z- and u-scores for the laboratory with code 36.

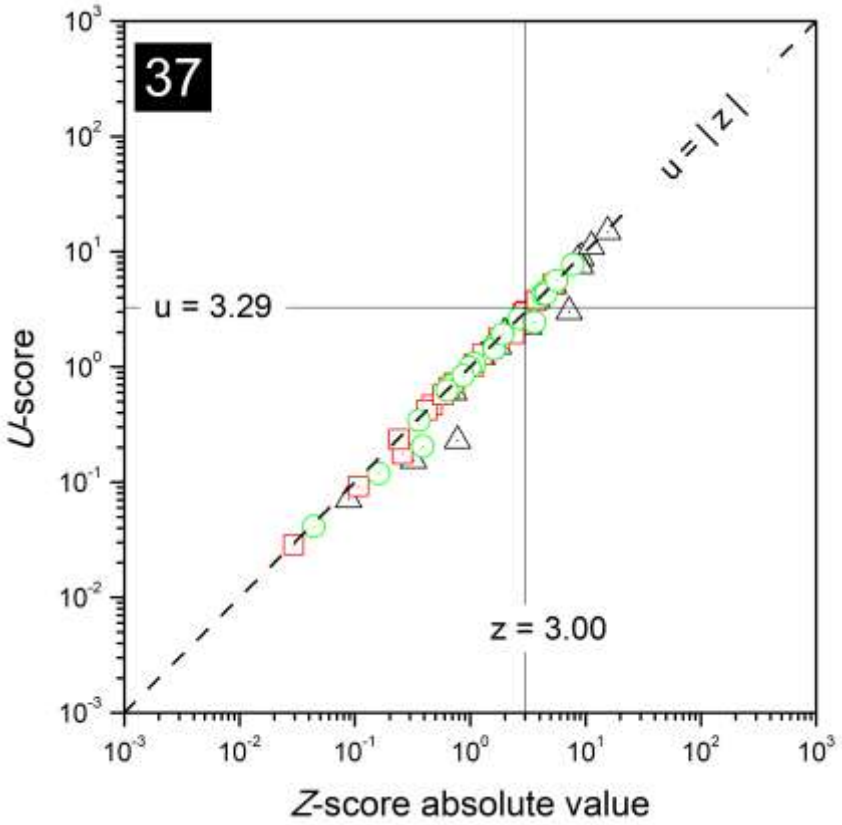

FIG. 61. Combined plots of z- and u-scores for the laboratory with code 37.

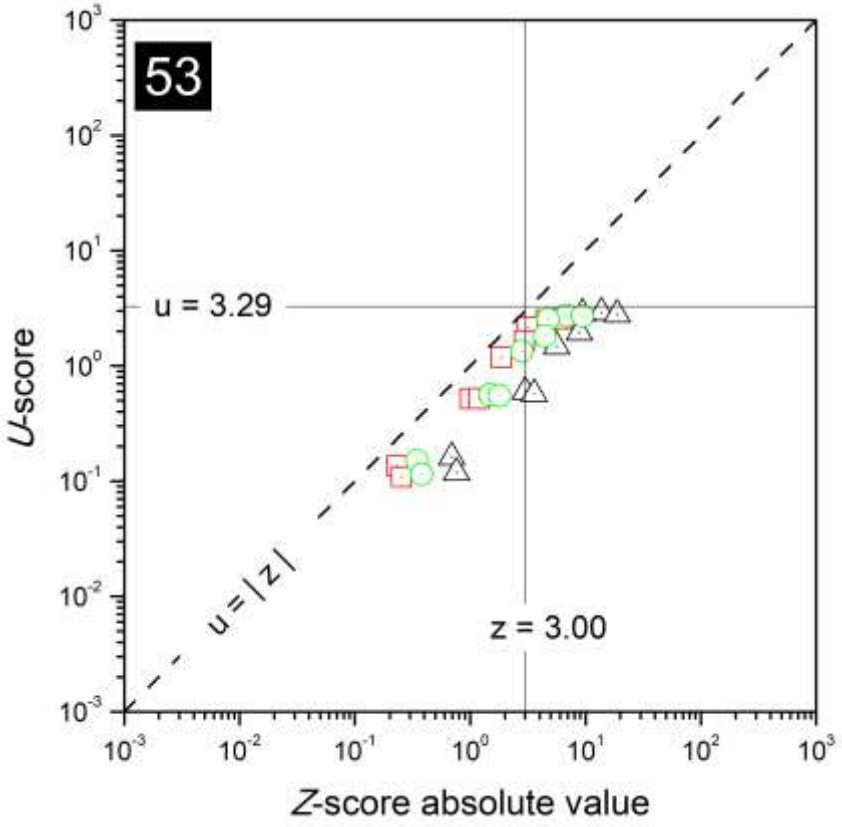

FIG. 62. Combined plots of z- and u-scores for the laboratory with code 53.

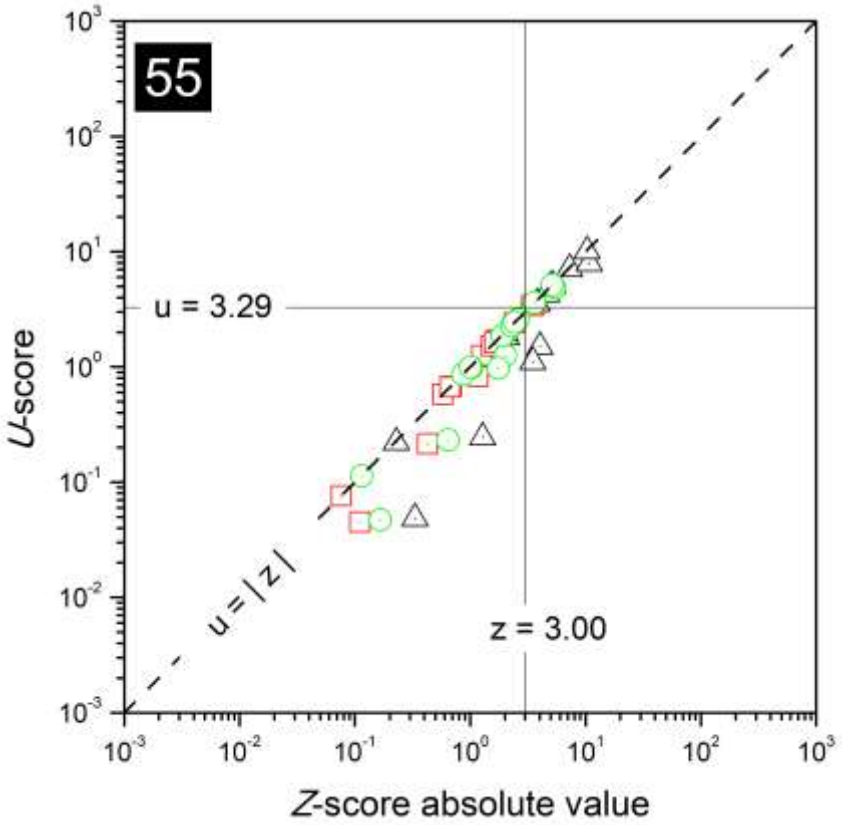

FIG. 63. Combined plots of z- and u-scores for the laboratory with code 55.

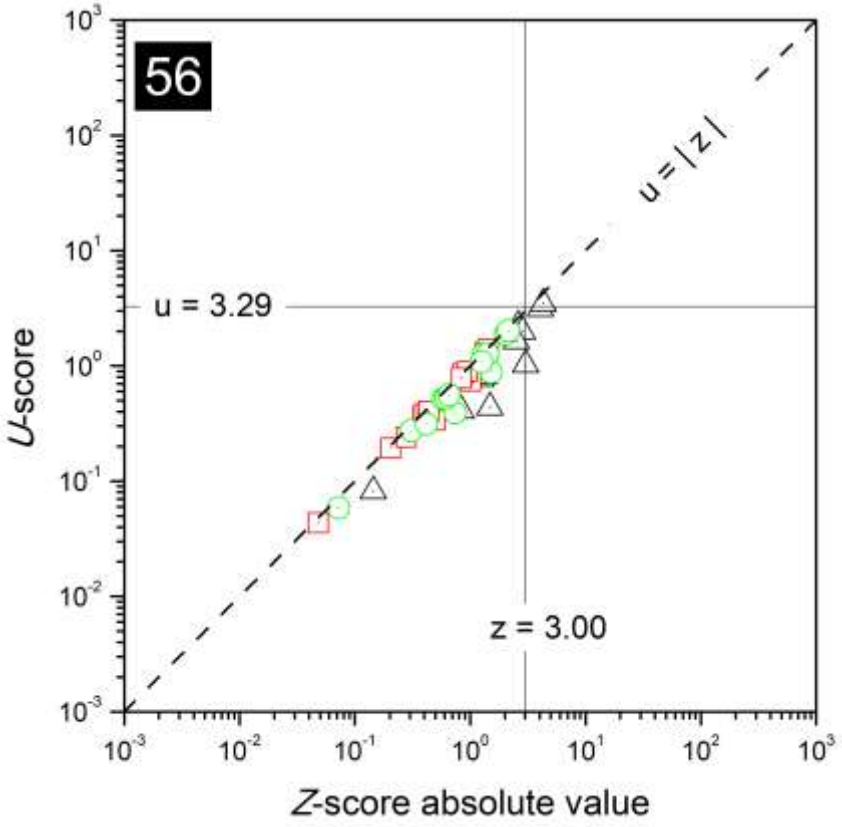

FIG. 64. Combined plots of z- and u-scores for the laboratory with code 56.

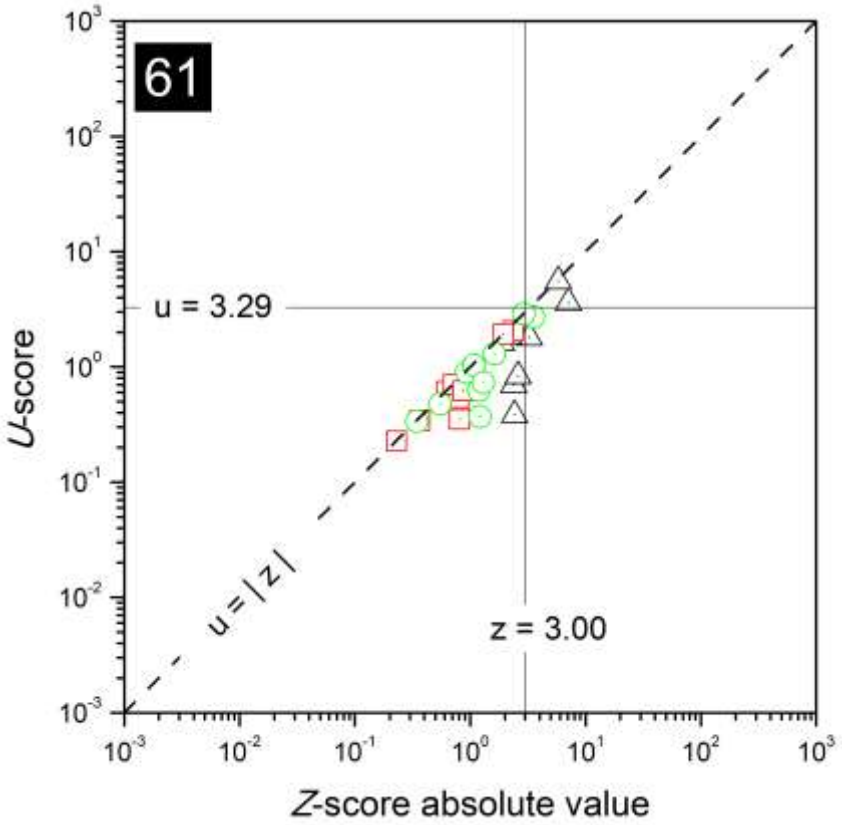

FIG. 65. Combined plots of z- and u-scores for the laboratory with code 61.

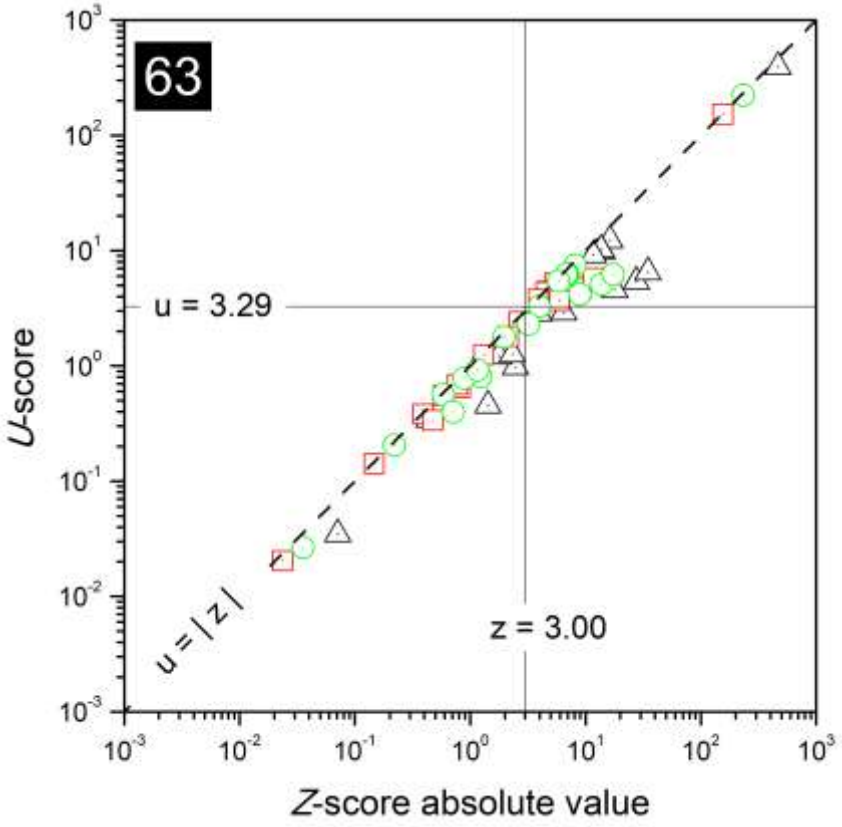

FIG. 66. Combined plots of z- and u-scores for the laboratory with code 63.

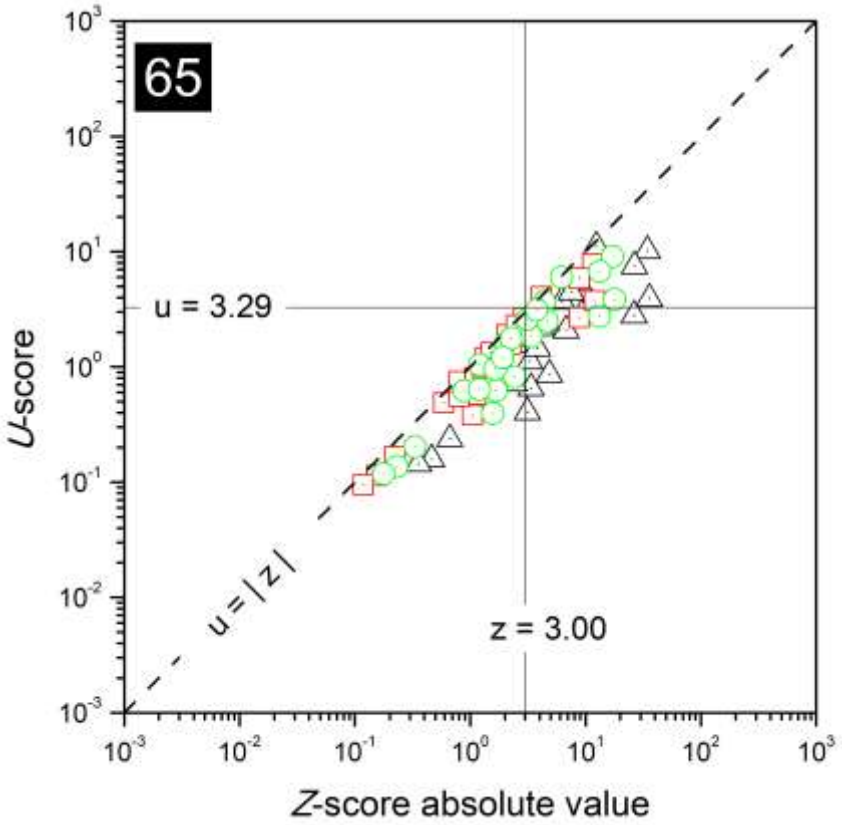

FIG. 67. Combined plots of z- and u-scores for the laboratory with code 65.

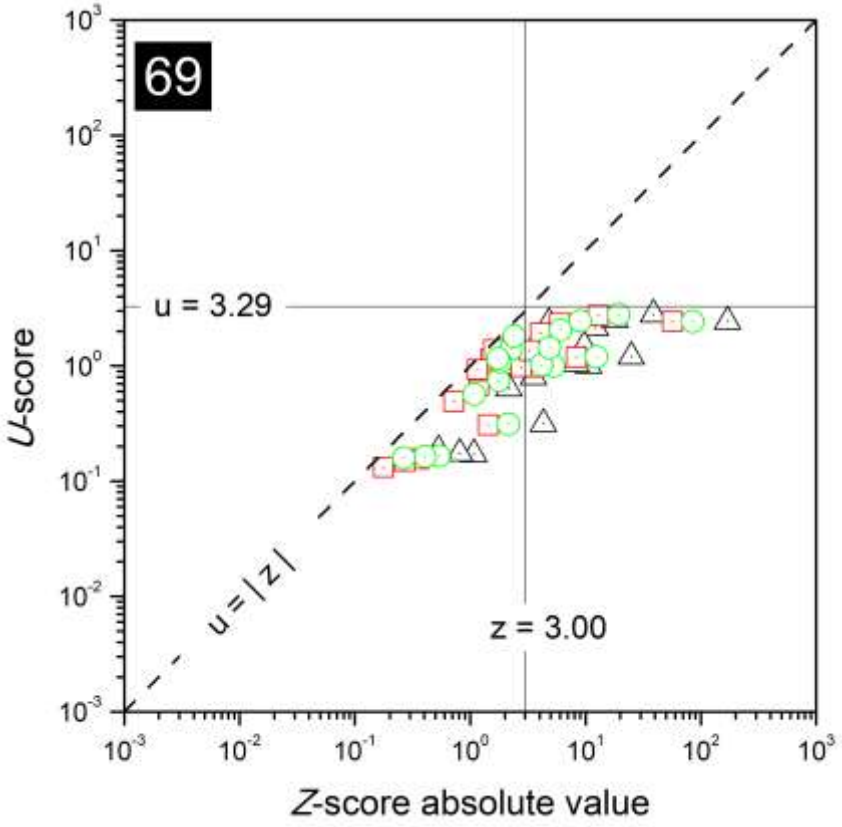

FIG. 68. Combined plots of z- and u-scores for the laboratory with code 69.

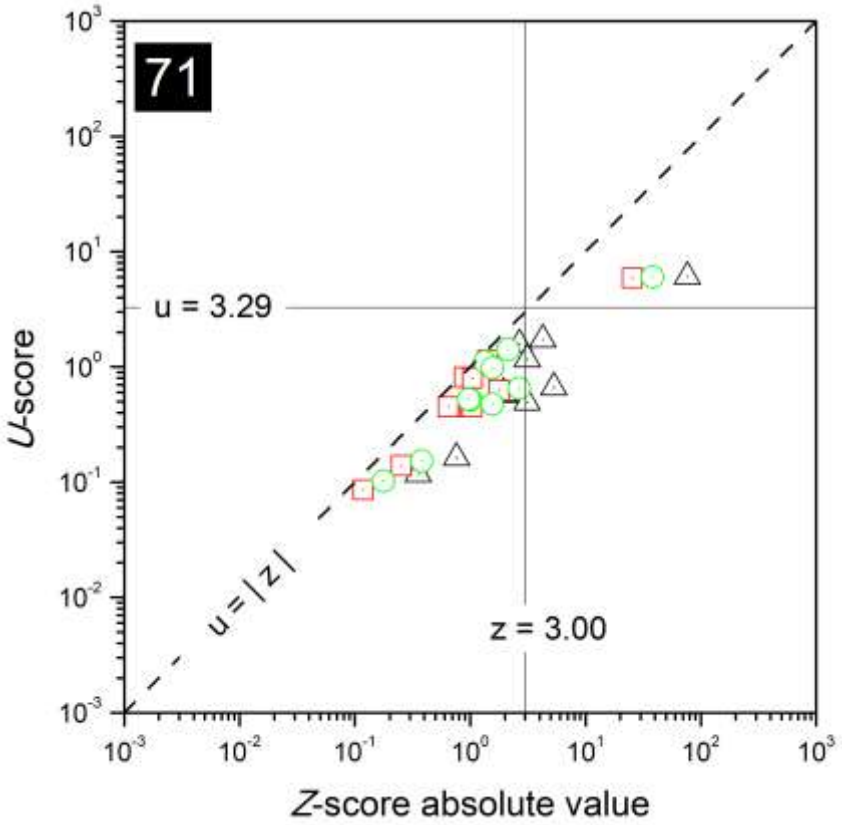

FIG. 69. Combined plots of z- and u-scores for the laboratory with code 71.

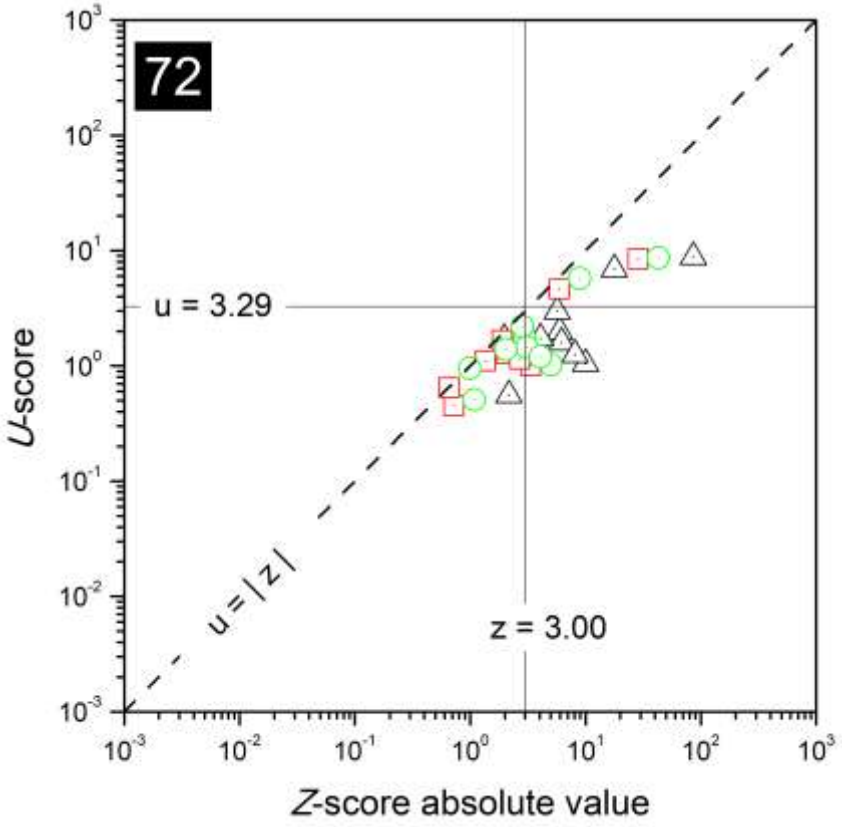

FIG. 70. Combined plots of z- and u-scores for the laboratory with code 72.

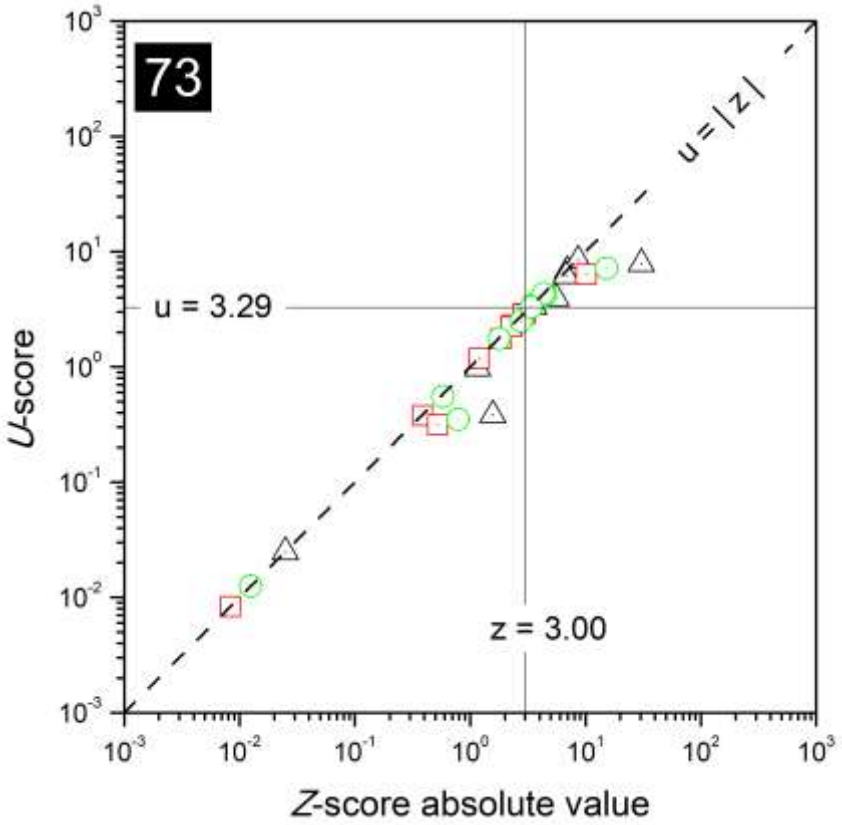

FIG. 71. Combined plots of z- and u-scores for the laboratory with code 73.

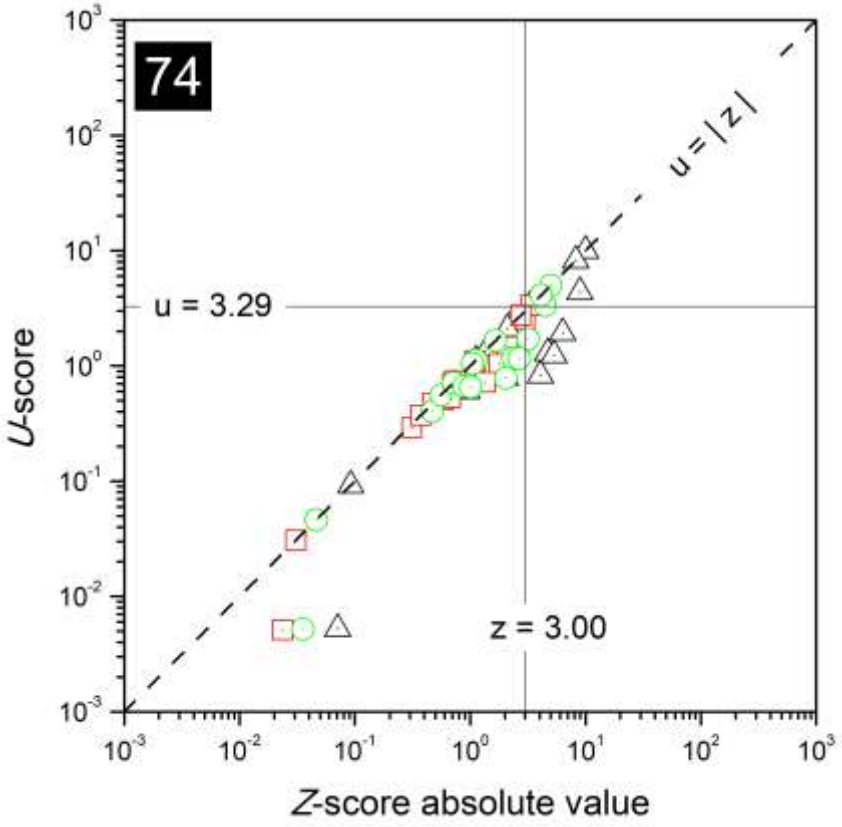

FIG. 72. Combined plots of z- and u-scores for the laboratory with code 74.

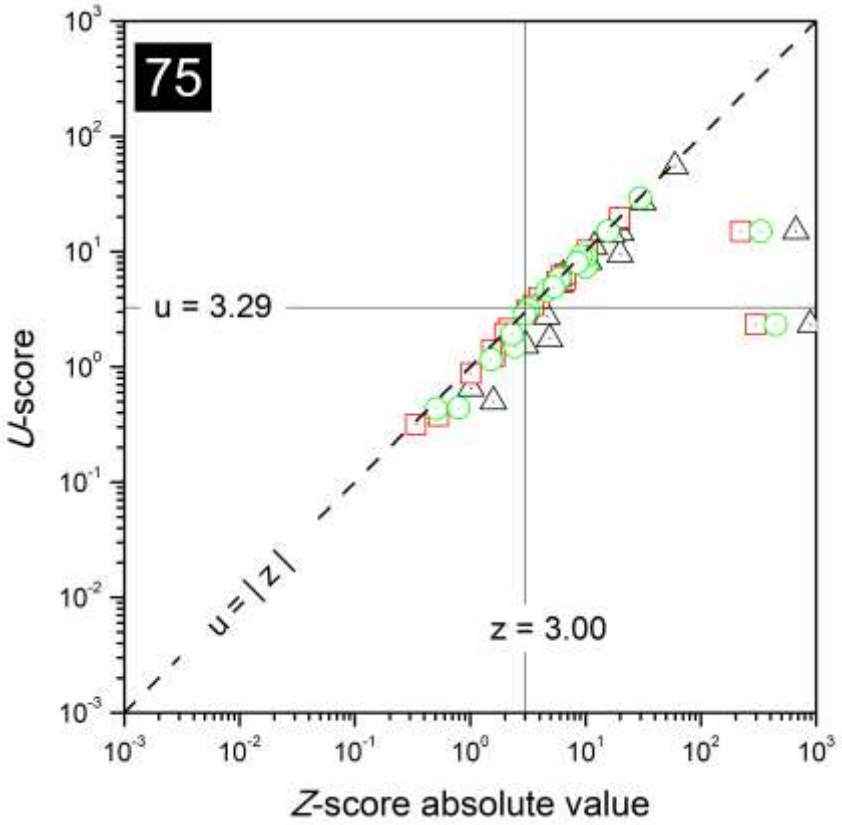

FIG. 73. Combined plots of z- and u-scores for the laboratory with code 75.

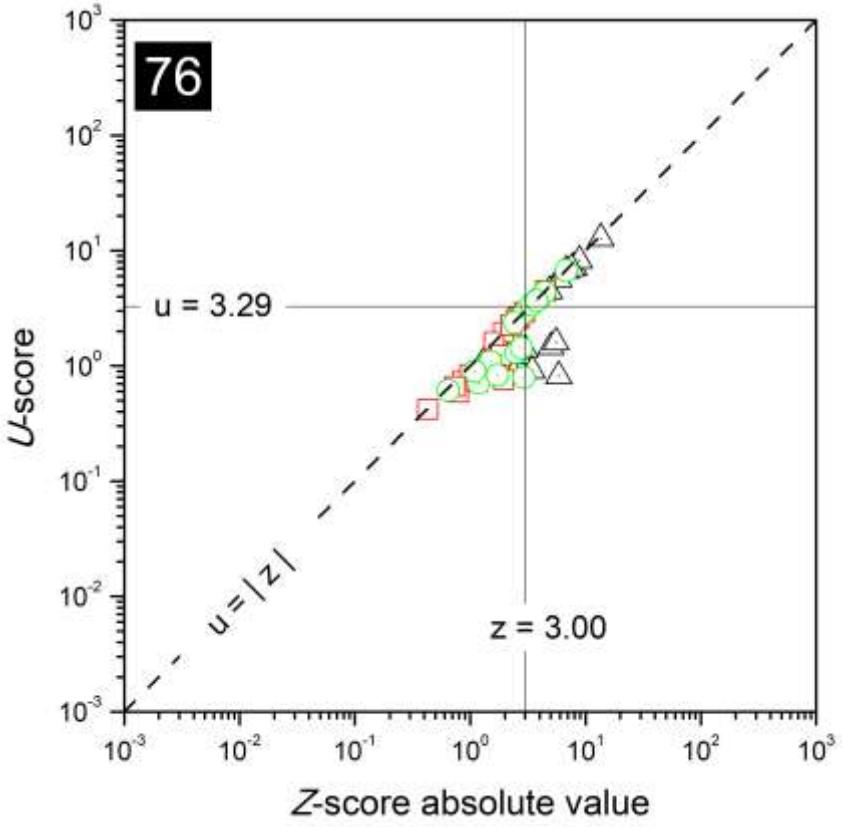

FIG. 74. Combined plots of z- and u-scores for the laboratory with code 76.

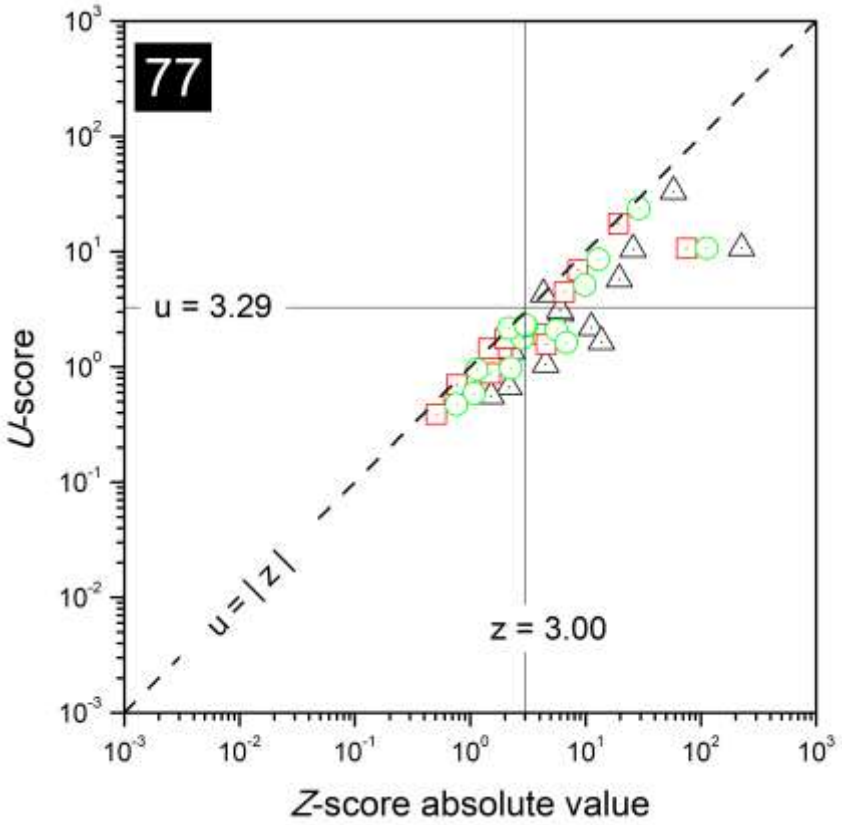

FIG. 75. Combined plots of z- and u-scores for the laboratory with code 77.

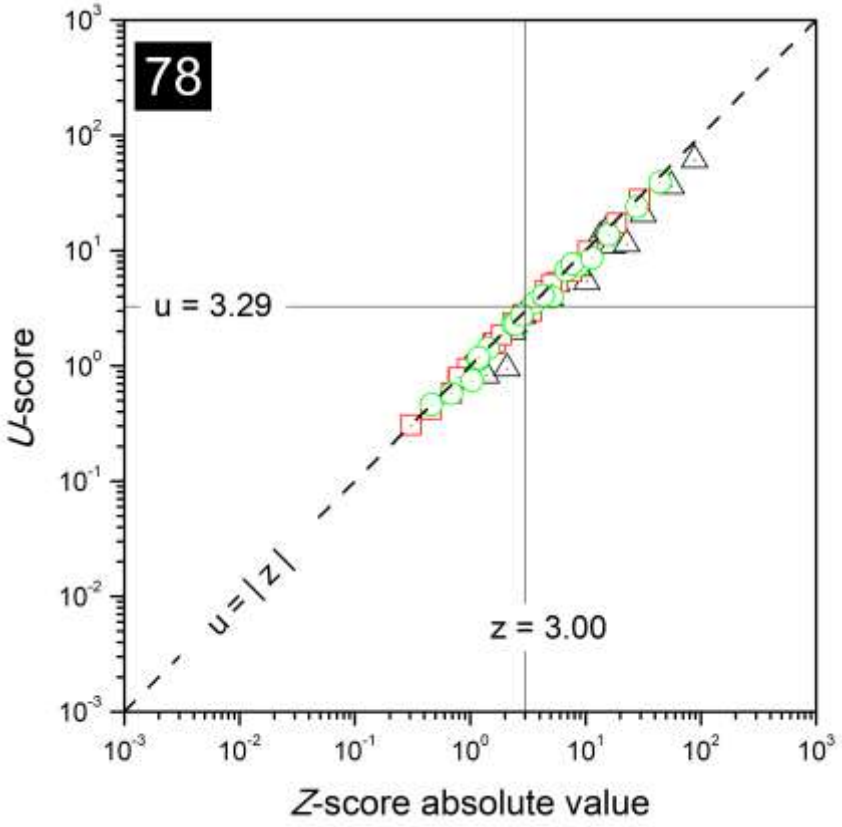

FIG. 76. Combined plots of z- and u-scores for the laboratory with code 78.

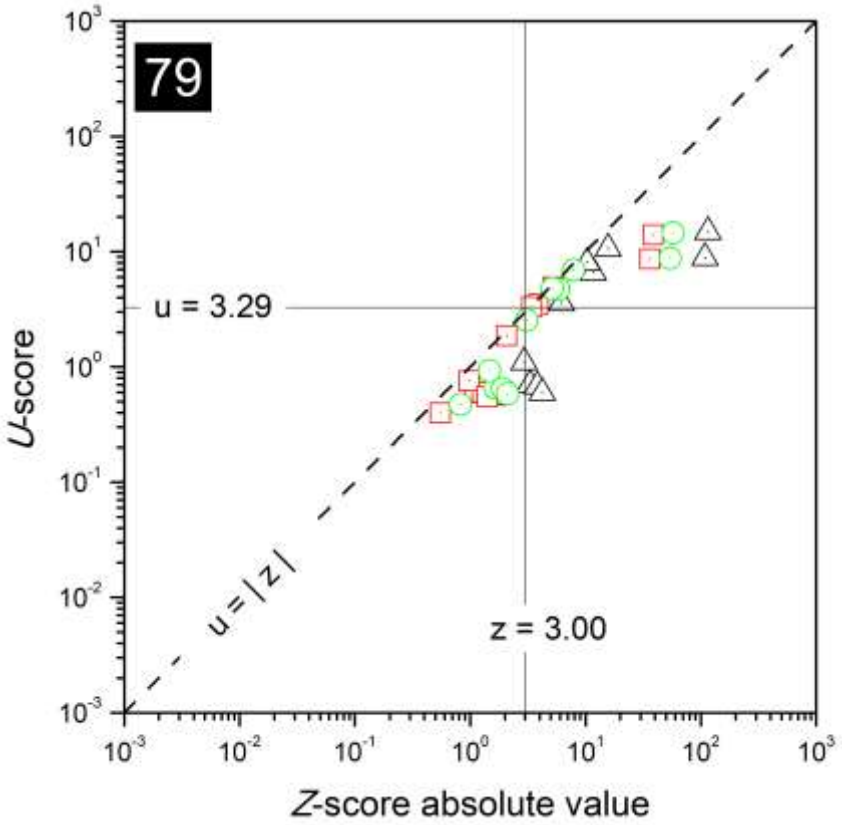

FIG. 77. Combined plots of z- and u-scores for the laboratory with code 79.

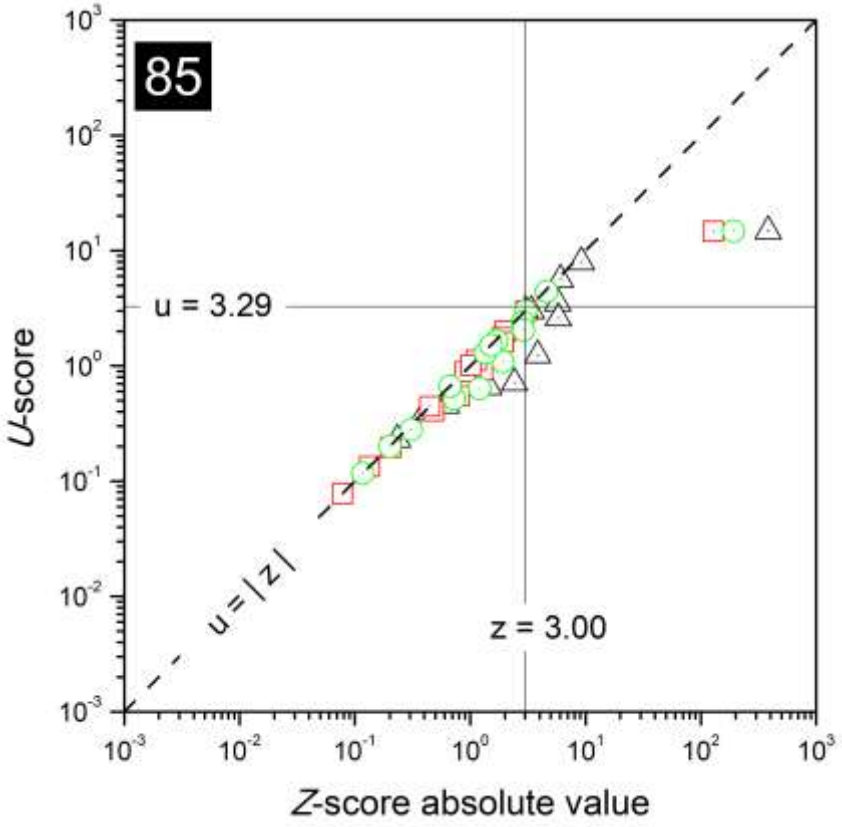

FIG. 78. Combined plots of z- and u-scores for the laboratory with code 85.

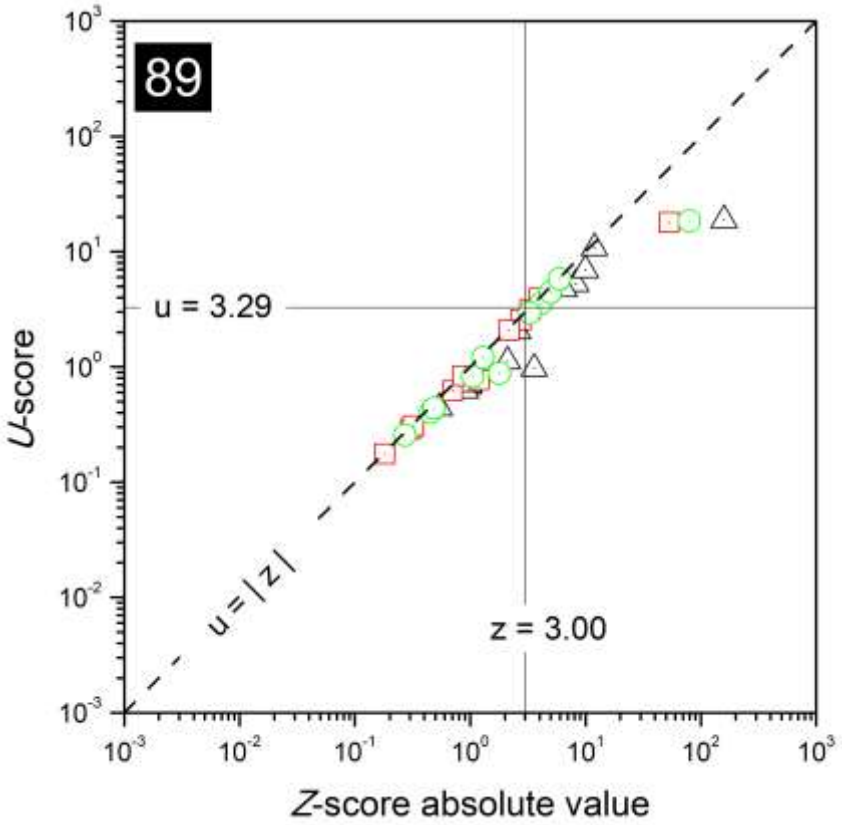

FIG. 79. Combined plots of z- and u-scores for the laboratory with code 89.

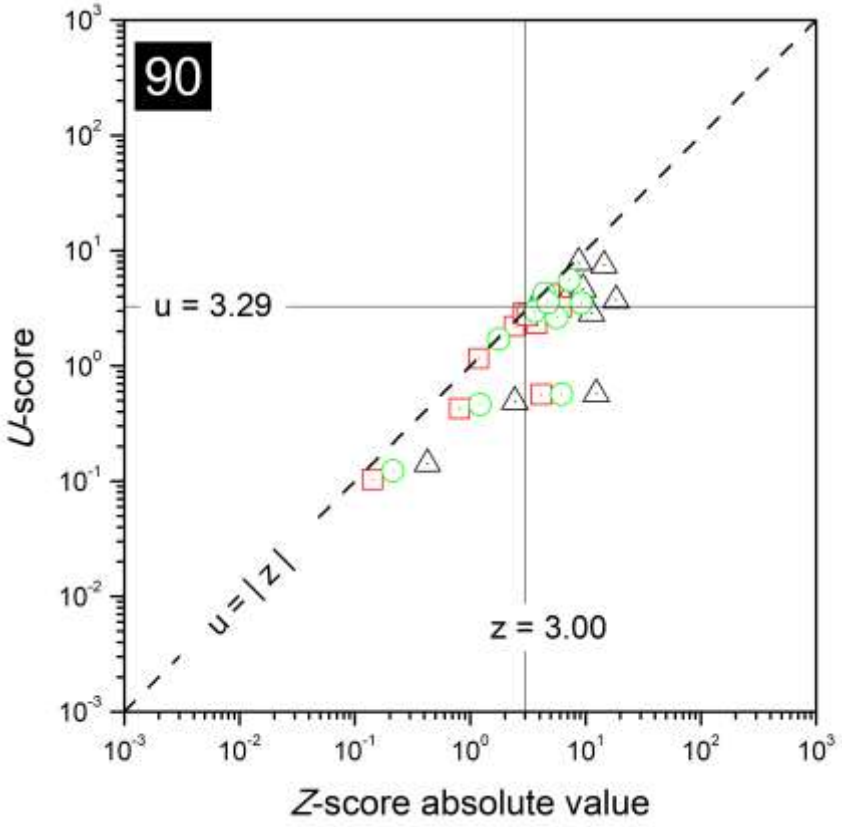

FIG. 80. Combined plots of z- and u-scores for the laboratory with code 90.

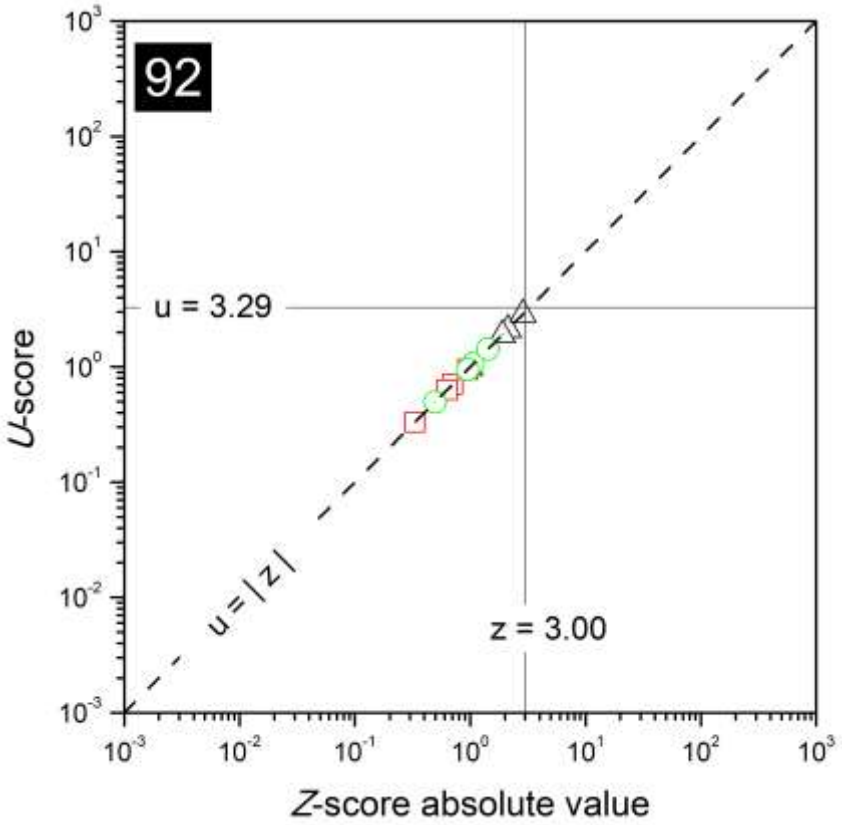

FIG. 81. Combined plots of z- and u-scores for the laboratory with code 92.

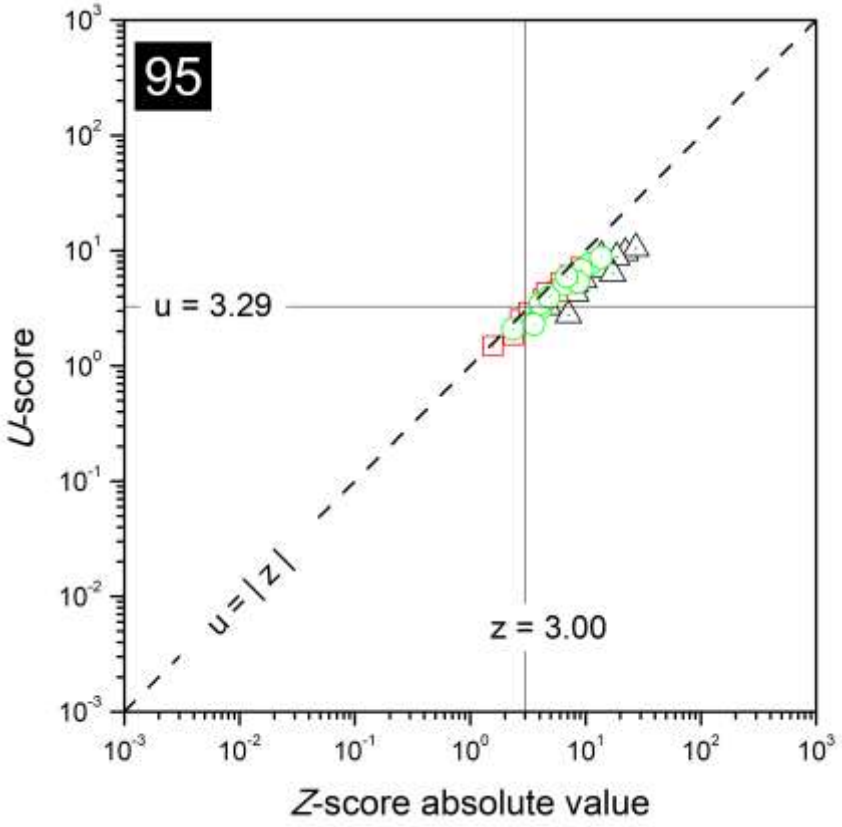

FIG. 82. Combined plots of z- and u-scores for the laboratory with code 95.

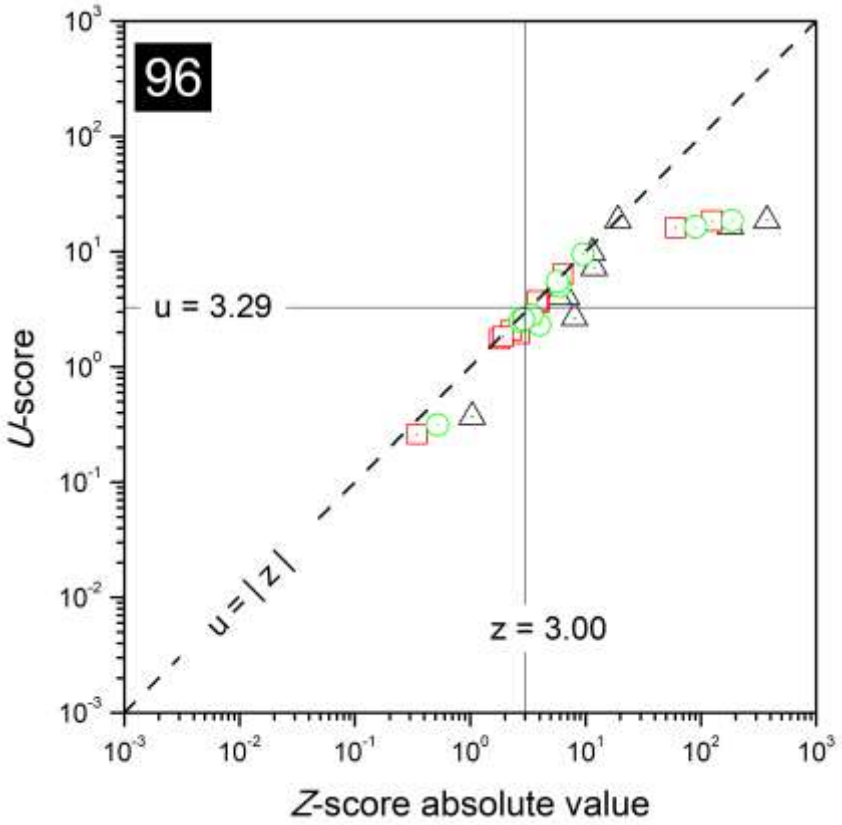

FIG. 83. Combined plots of z- and u-scores for the laboratory with code 96.

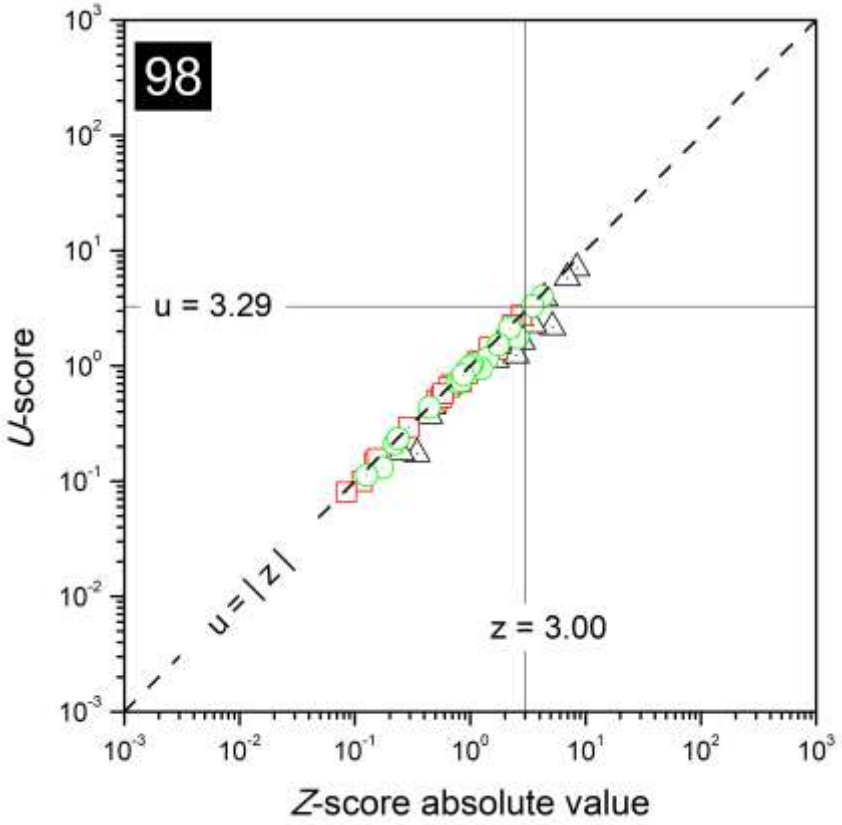

FIG. 84. Combined plots of z- and u-scores for the laboratory with code 98.

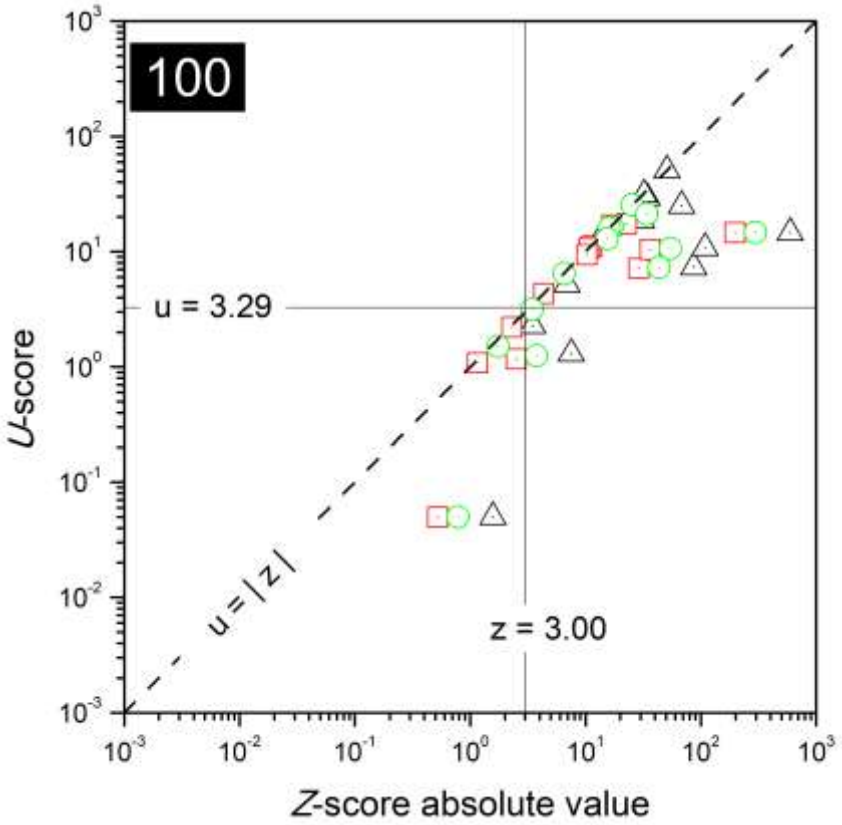

FIG. 85. Combined plots of z- and u-scores for the laboratory with code 100.

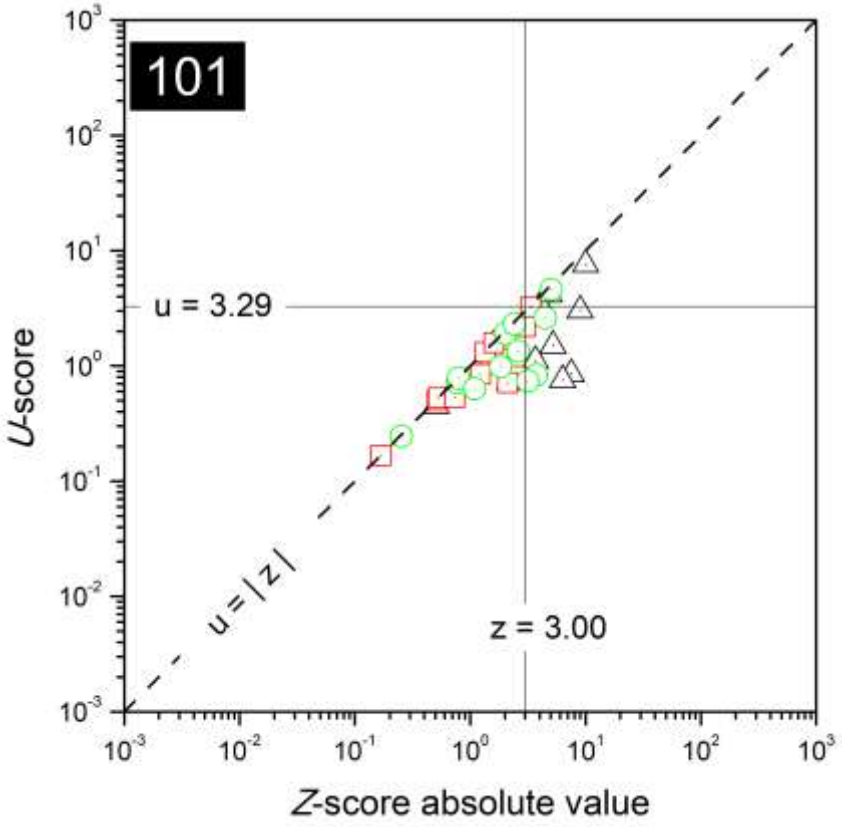

FIG. 86. Combined plots of z- and u-scores for the laboratory with code 101.

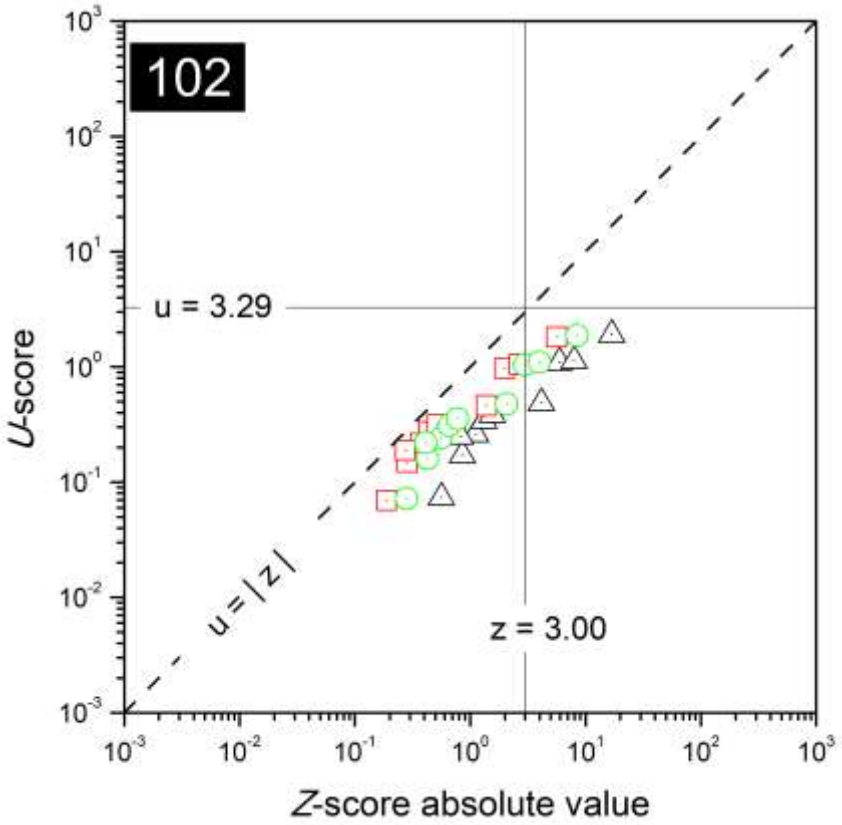

FIG. 87. Combined plots of z- and u-scores for the laboratory with code 102.

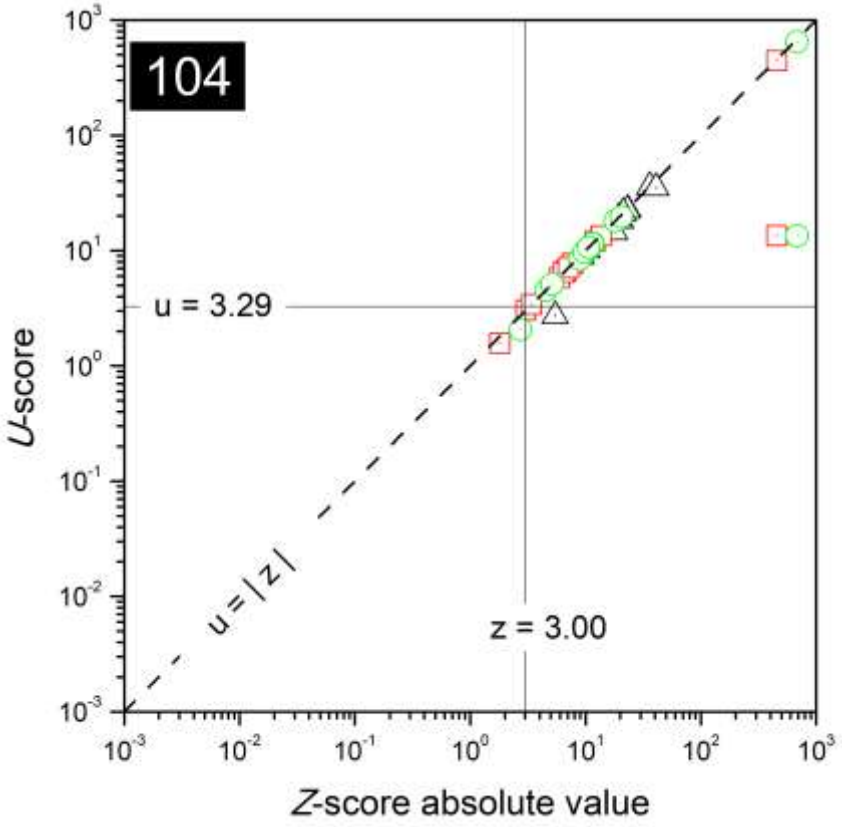

FIG. 88. Combined plots of z- and u-scores for the laboratory with code 104.

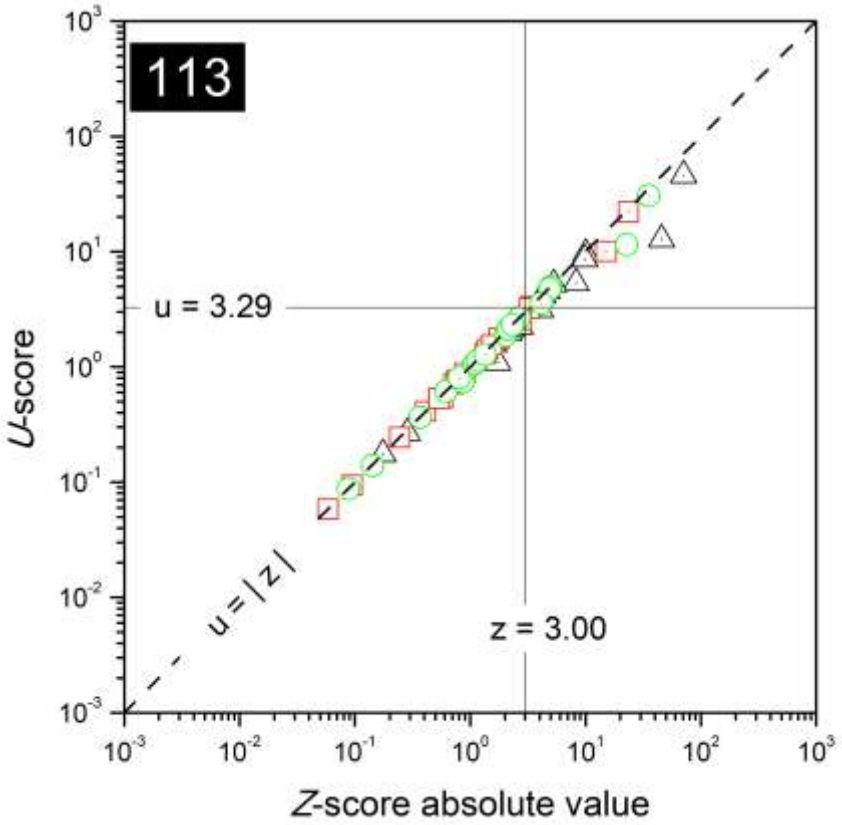

FIG. 89. Combined plots of z- and u-scores for the laboratory with code 113.

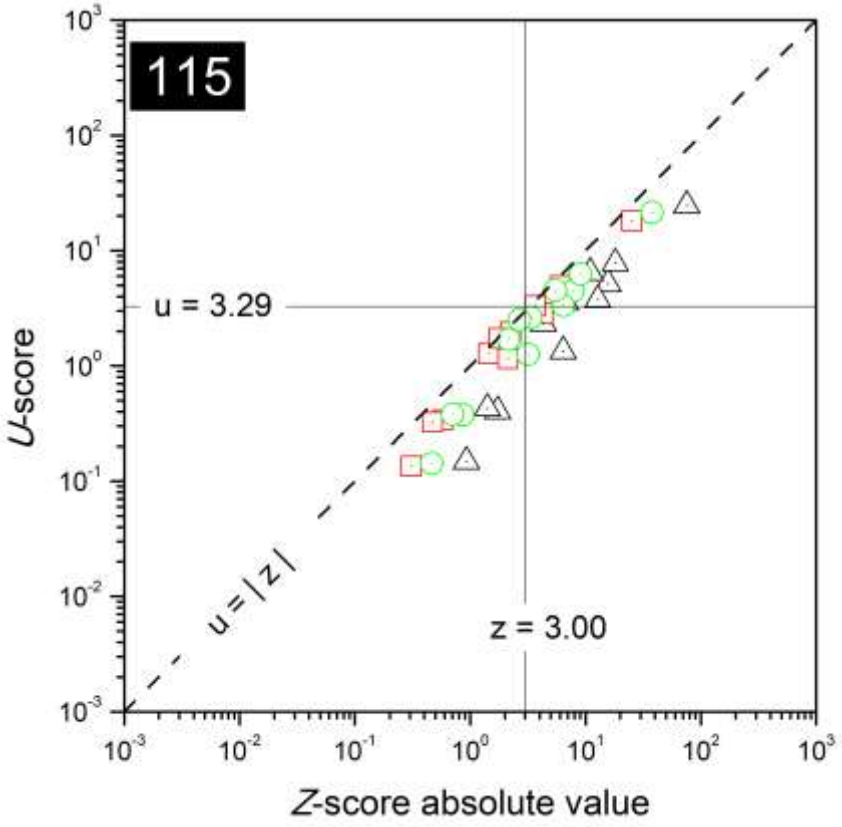

FIG. 90. Combined plots of z- and u-scores for the laboratory with code 115.

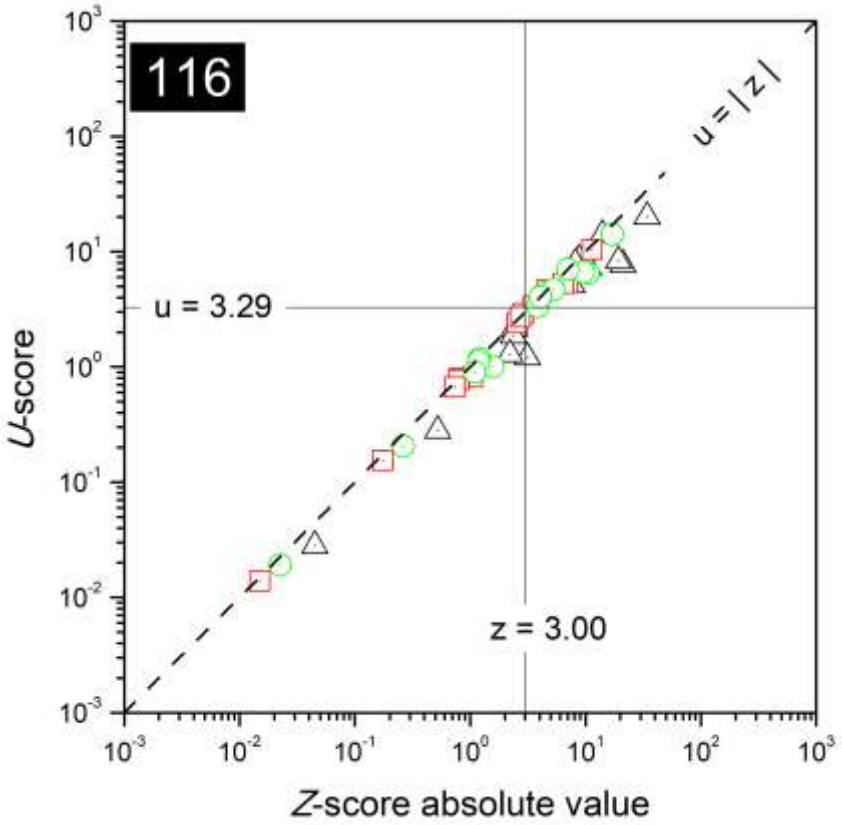

FIG. 91. Combined plots of z- and u-scores for the laboratory with code 116.

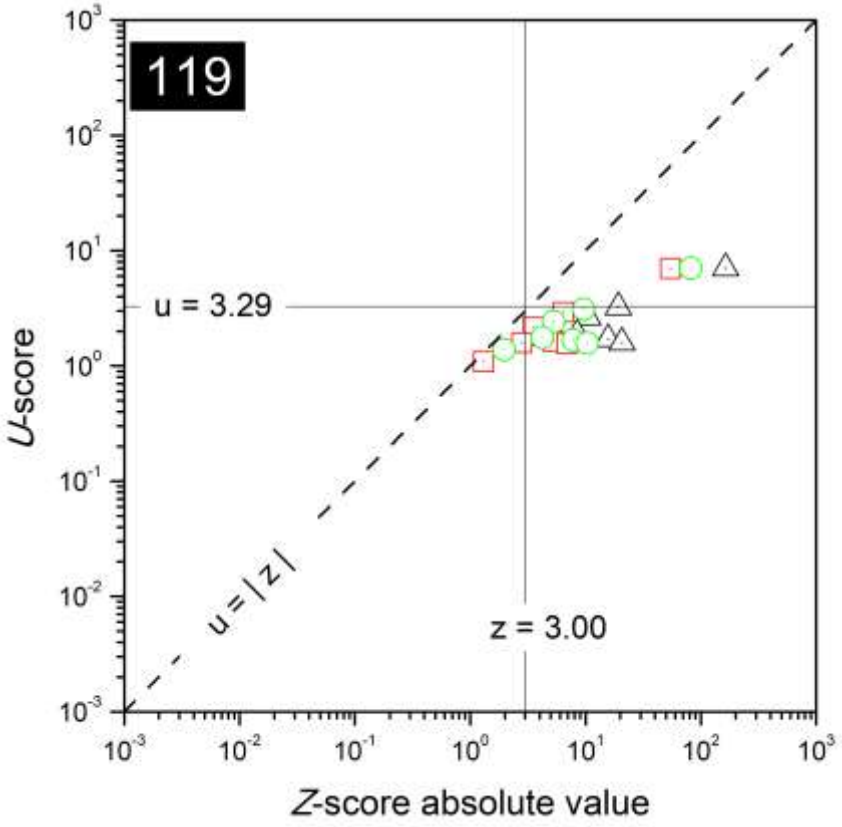

FIG. 92. Combined plots of z- and u-scores for the laboratory with code 119.

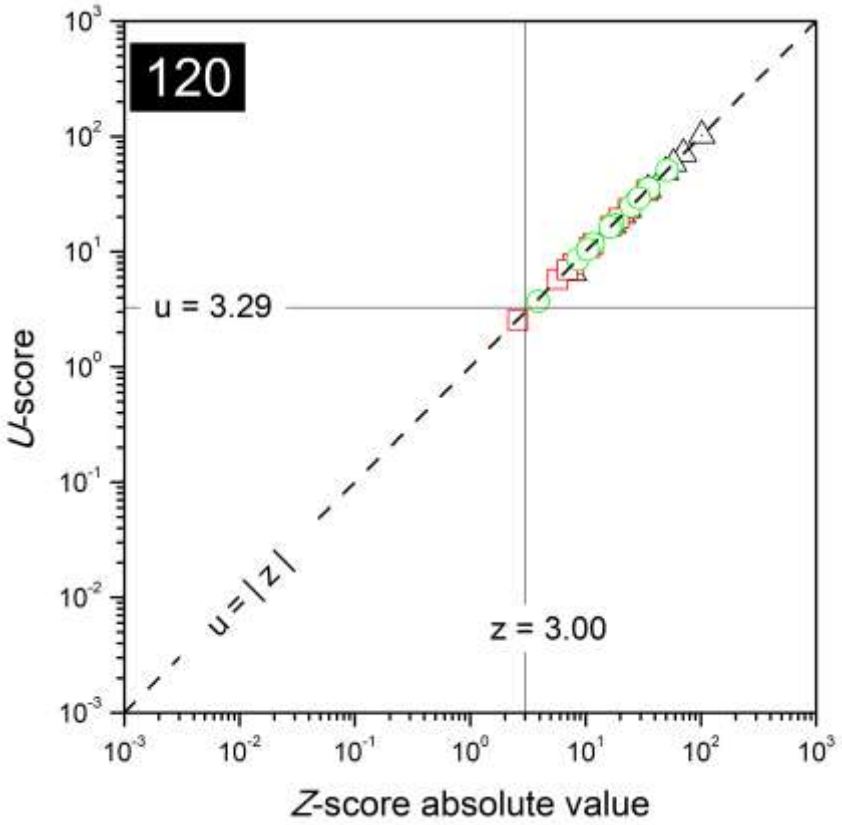

FIG. 93. Combined plots of z- and u-scores for the laboratory with code 120.

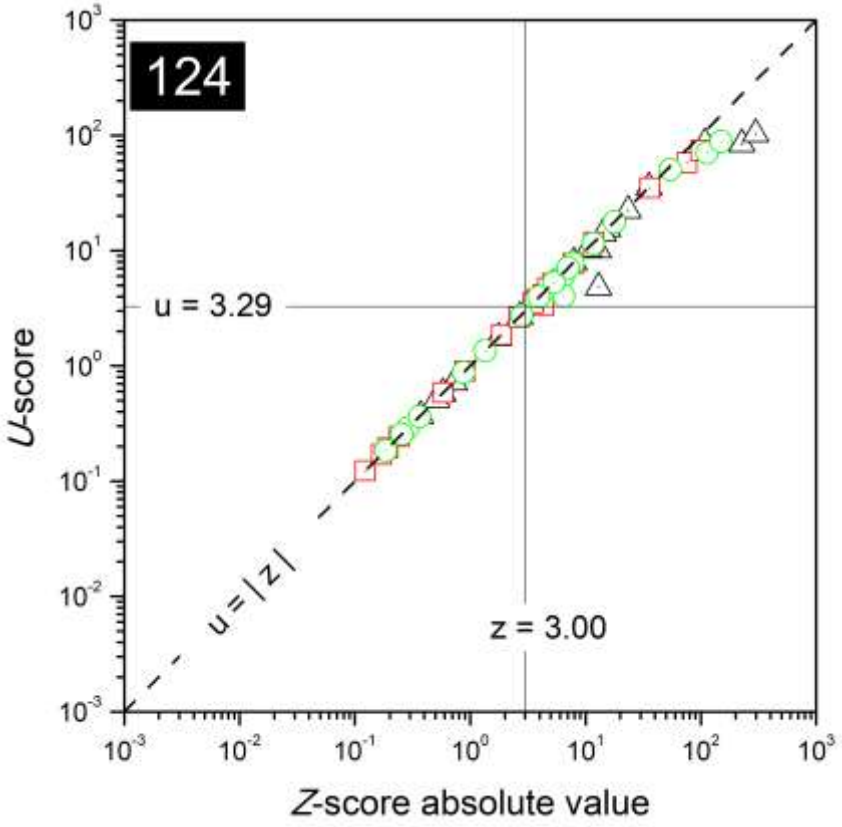

FIG. 94. Combined plots of z- and u-scores for the laboratory with code 124.

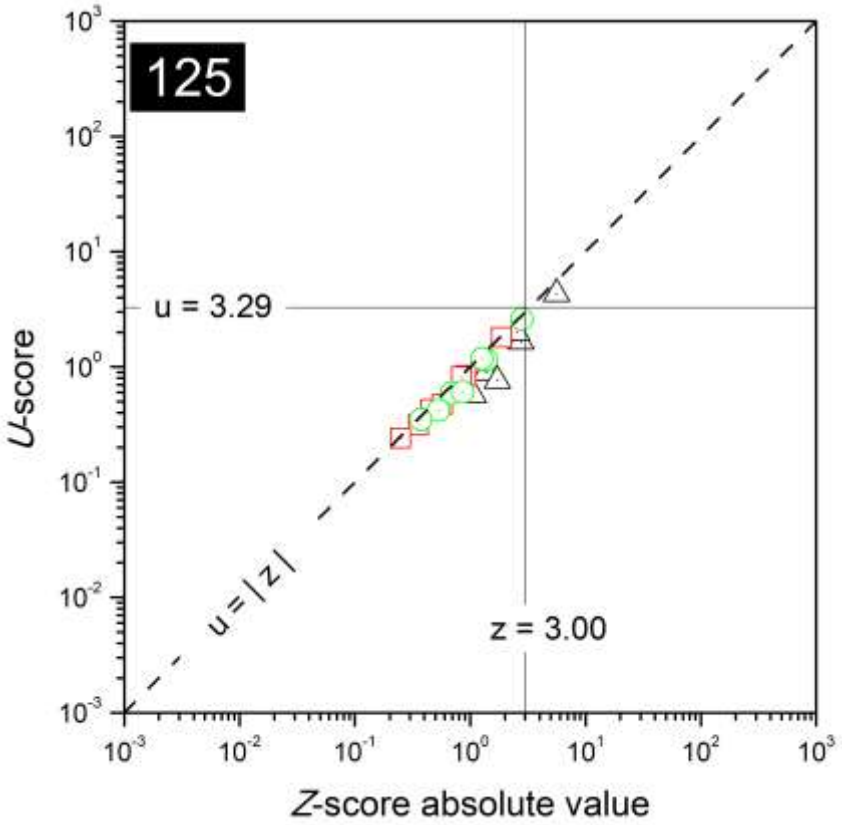

FIG. 95. Combined plots of z- and u-scores for the laboratory with code 125.

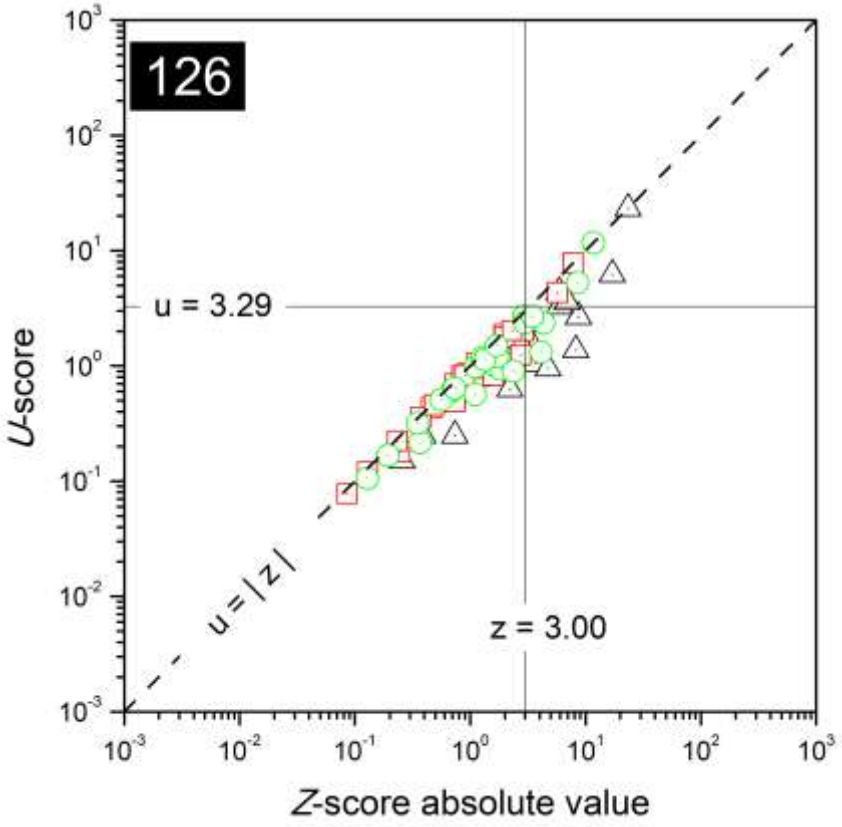

FIG. 96. Combined plots of z- and u-scores for the laboratory with code 126.

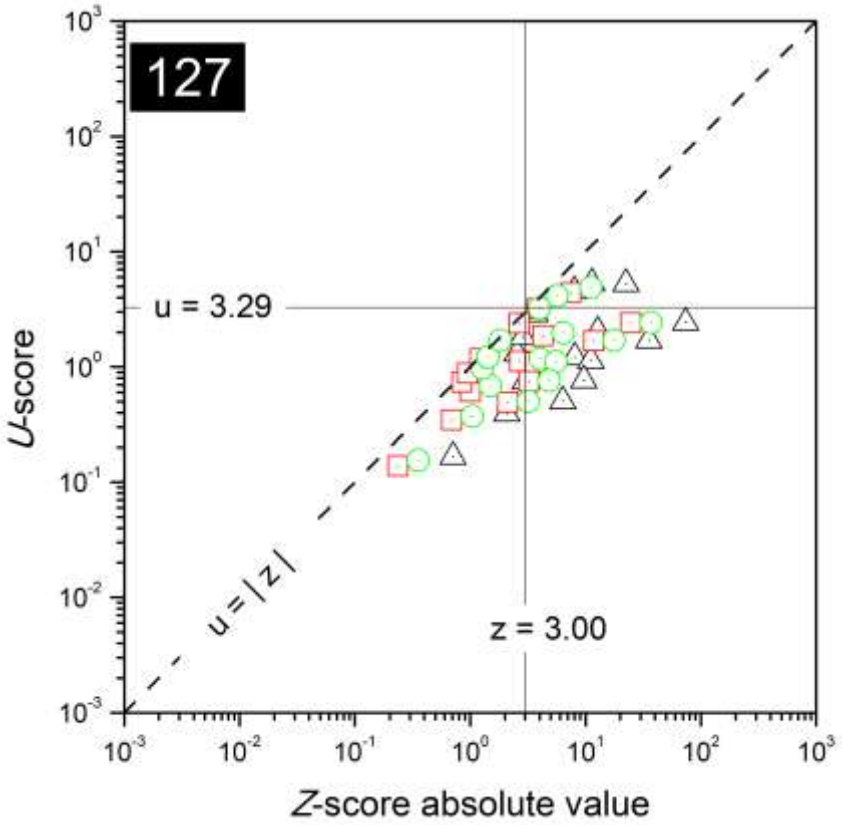

FIG. 97. Combined plots of z- and u-scores for the laboratory with code 127.

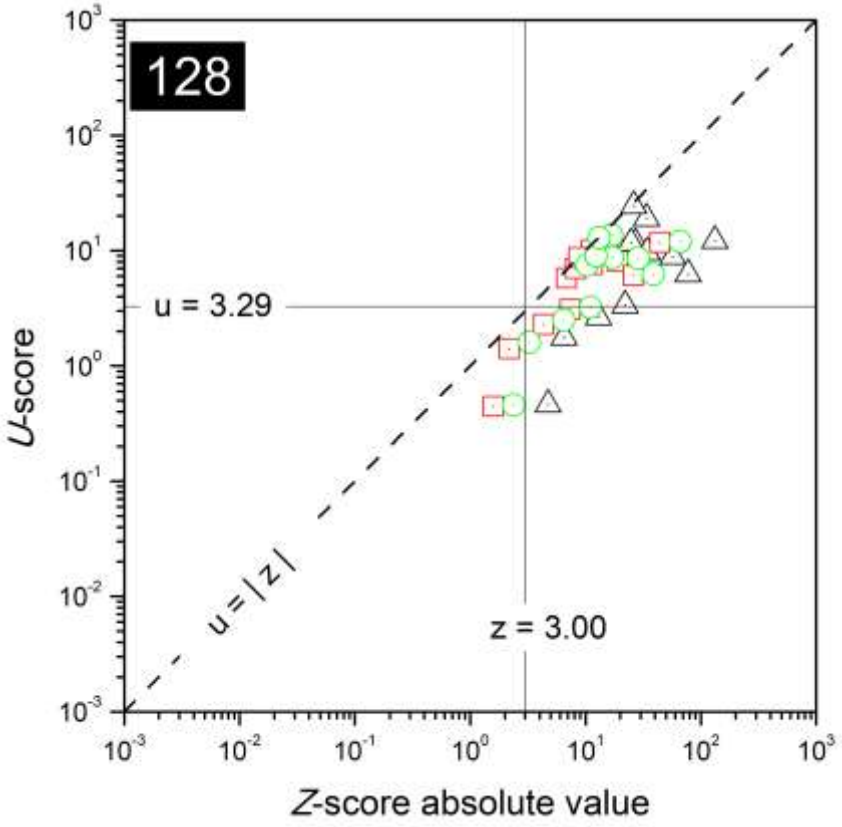

FIG. 98. Combined plots of z- and u-scores for the laboratory with code 128.

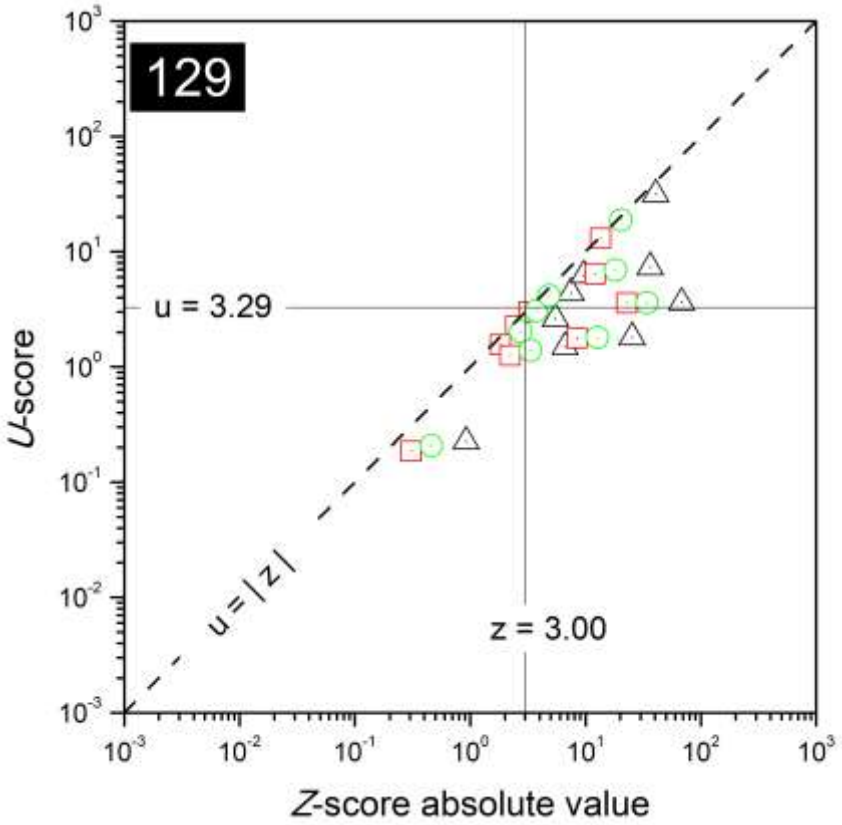

FIG. 99. Combined plots of z- and u-scores for the laboratory with code 129.

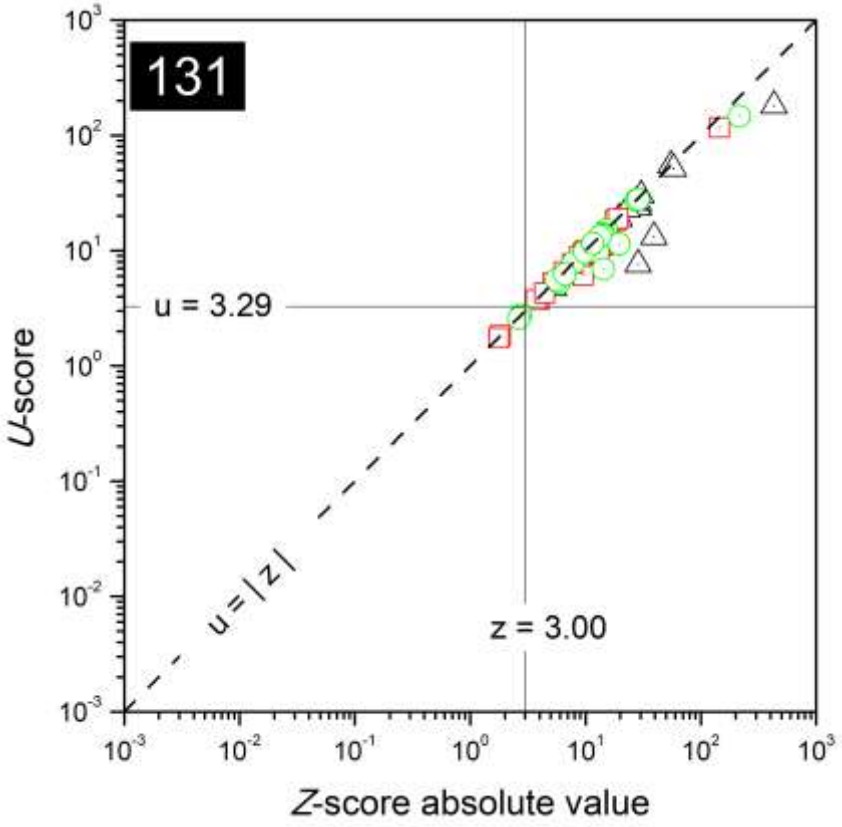

FIG. 100. Combined plots of z- and u-scores for the laboratory with code 131.

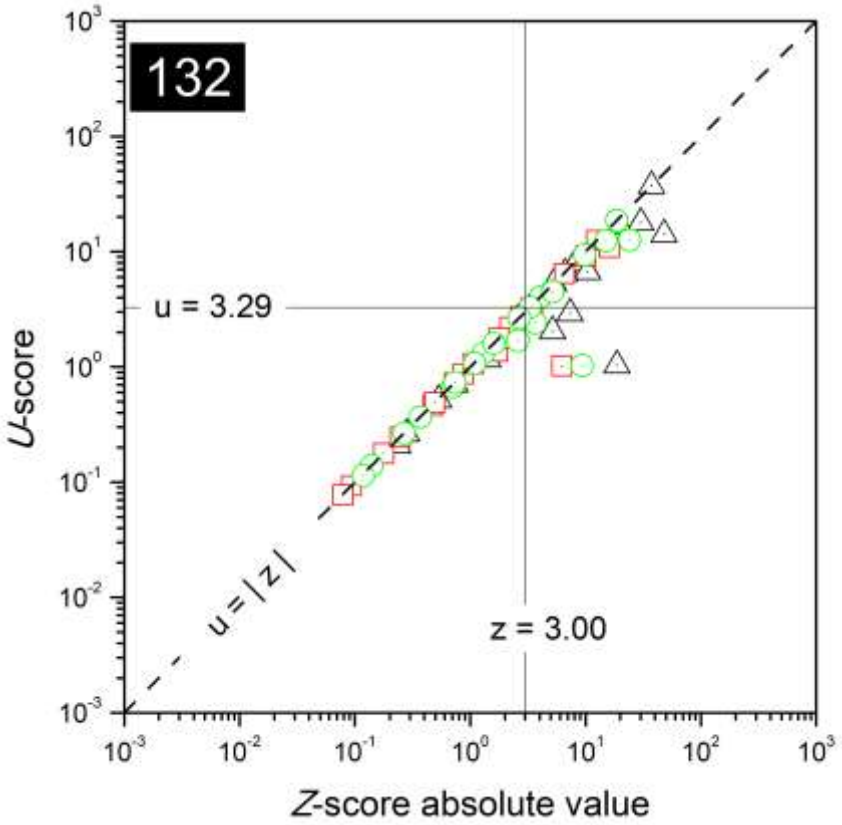

FIG. 101. Combined plots of z- and u-scores for the laboratory with code 132.

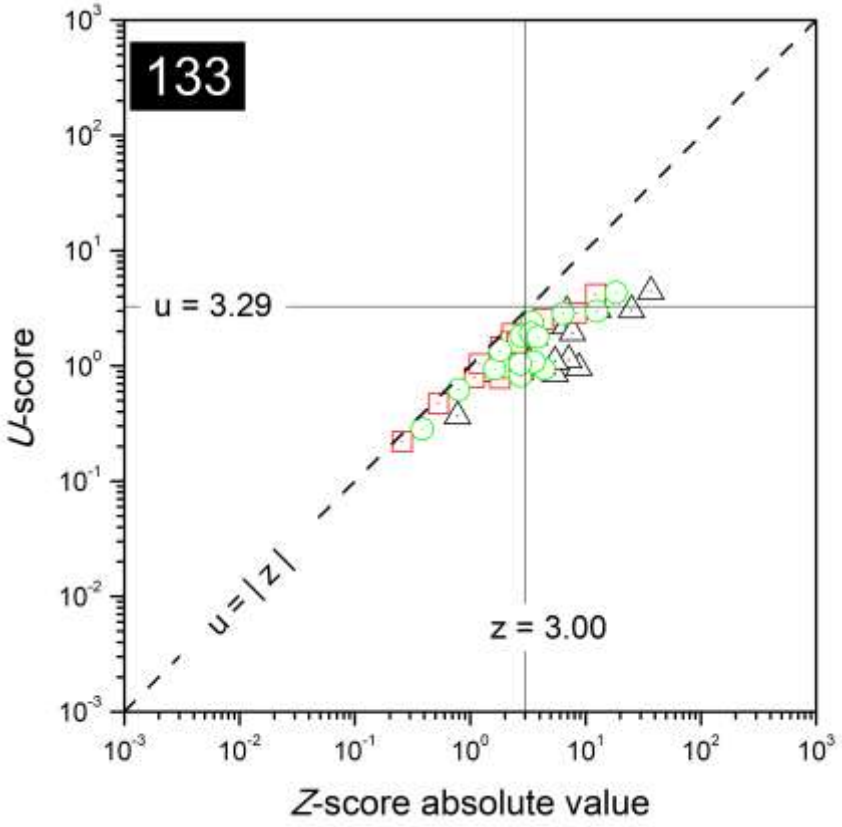

FIG. 102. Combined plots of z- and u-scores for the laboratory with code 133.

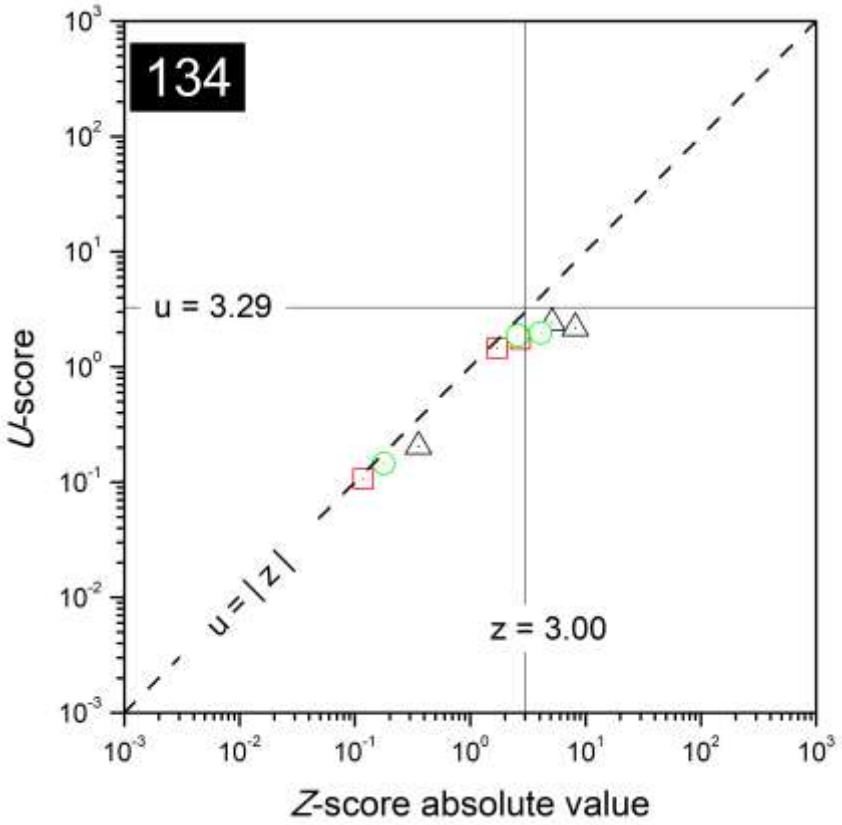

FIG. 103. Combined plots of z- and u-scores for the laboratory with code 134.

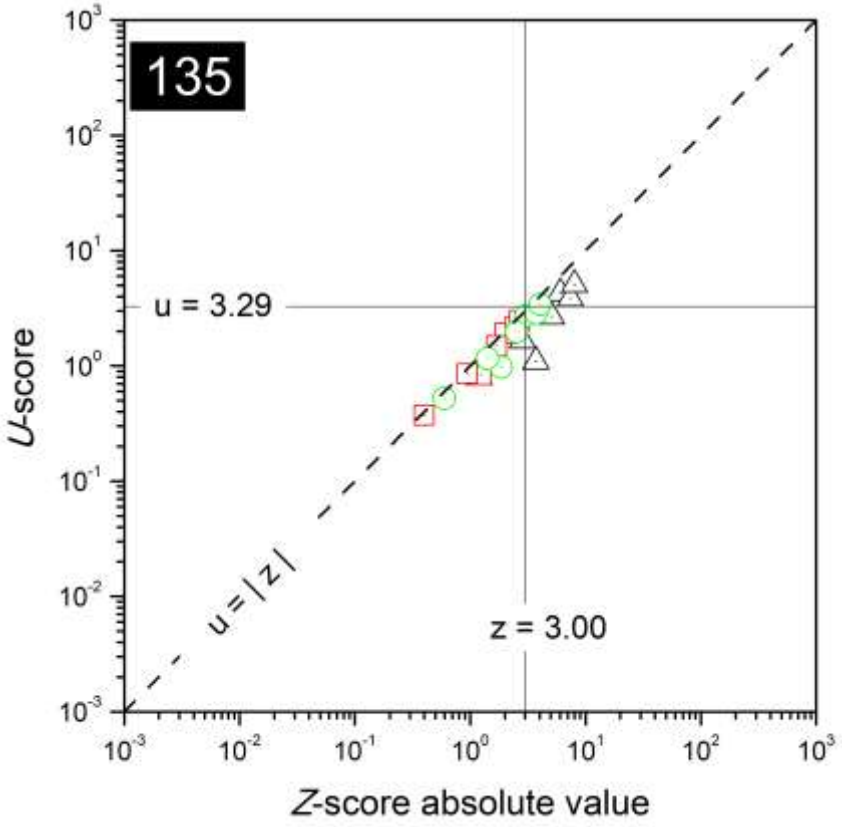

FIG. 104. Combined plots of z- and u-scores for the laboratory with code 135.

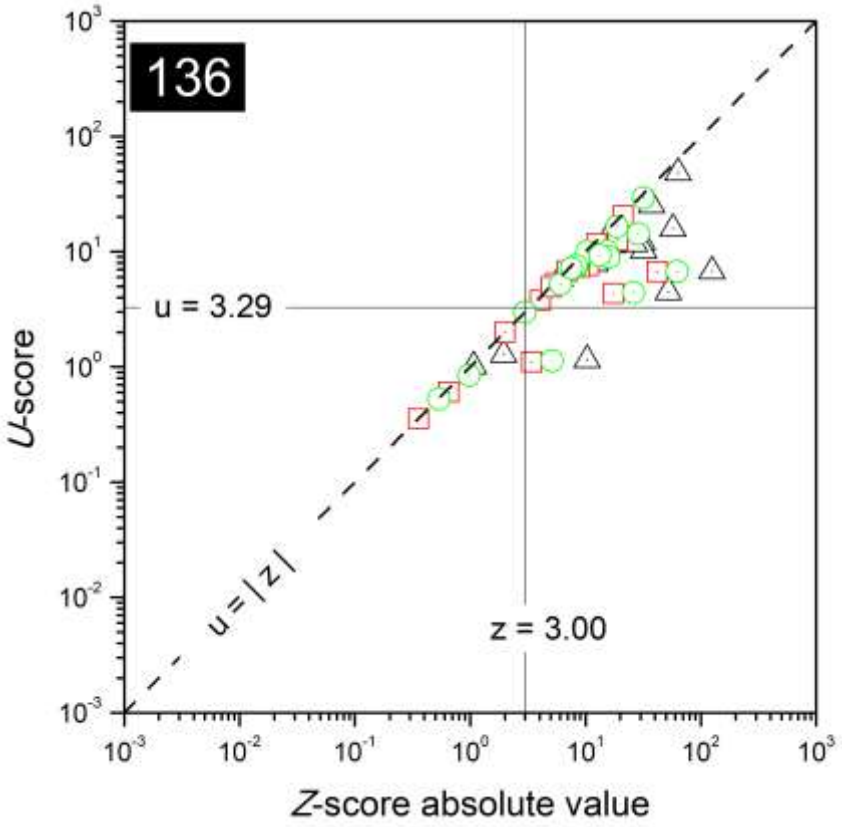

FIG. 105. Combined plots of z- and u-scores for the laboratory with code 136.

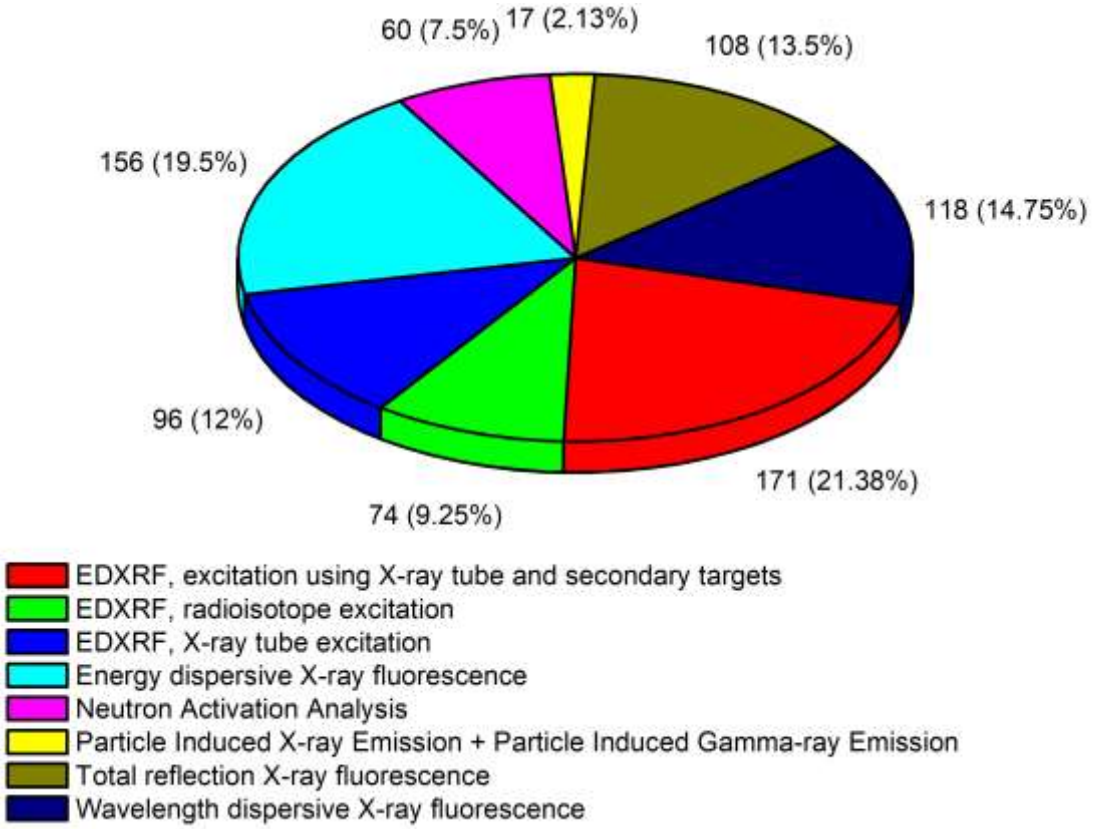

FIG. 106. Utilization of analytical techniques. For each analytical technique the number of submitted results is shown. The percent values relate to the total number of 800 submitted results.

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GLOSSARY

The definitions of terms used in the proficiency testing schemes are provided. Although this terminology might be known to the participants or can be found elsewhere [8-10] the terms used in this report are clearly defined to avoid any ambiguity.

Proficiency testing: evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons.

True value: the actual concentration of the analyte in the matrix.

Assigned value: the value of the concentration of the analyte in the matrix used as the true value by the proficiency testing coordinator in the statistical treatment of results (or the best available estimate).

Target value for standard deviation: a numerical value for the standard deviation of a measurement result, which has been designated as a target for measurement quality.

Consensus value: the mean value of the reported laboratory results after the removal of outliers.

Standard deviation of the consensus value: the standard deviation of the mean value of the reported laboratory results after the removal of outliers.

Certified Reference Material: A reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes traceability to an accurate realization of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence.

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