

Test Group Summary Report
C01A Major Ions in Water
October 2019 PT Round



CALA
Proficiency Testing

1.0 THE PROFICIENCY TESTING REPORT

The Proficiency Testing Report consists of two parts:

CALA Proficiency Testing Report: This report contains participant-specific evaluations and other confidential information. This report is emailed to participants at the end of the study.

Test Group Summary Report: A Test Group Summary Report is created for each test group at the end of the study. These reports contain more detailed information on the study than are found in the participant-specific CALA Proficiency Testing Report. These reports do not contain any confidential information and are made available on the CALA web site.

2.0 DEFINITIONS

The participant-specific CALA Proficiency Testing Report contains some terms that new participants may not be familiar with.

Code:	The registration code that is unique to each analyte that a participant is registered for.
App:	If a participant is accredited by CALA, this three digit number is the appendix number that the accredited method is assigned to.
N:	The number of participants results that were used to calculate the summary statistics. This excludes qualified data (e.g., <) and any results that were flagged as outliers.
Assigned:	The Assigned Value is the robust mean of the reported results, outliers excluded. This is often referred to as the “target” value.
± u:	The uncertainty of the assigned value.
Reported:	The result reported by the participant.
s:	The Standard Deviation of Proficiency Assessment. This value is used to determine the acceptance limits for the PT evaluation.
z-Score:	A value assigned to each reported result that is a measure of how much it deviates from the Assigned Value.
Score:	The composite score of the four results reported for each analyte. It is normalized to a score out of 100.
Bias:	A flag assigned if bias is detected using the re-scaled z-score procedure.

3.0 SCORING SYSTEM

Participant performance is evaluated for each proficiency testing sample by a quantitative method that is consistent with ISO/IEC 17043:2010 *Conformity assessment – General requirements for proficiency testing*, the *International Harmonized Protocol for Proficiency Testing of (Chemical) Analytical Laboratories* (2006), and ISO 13528:2015 *Statistical methods for use in proficiency testing by interlaboratory comparisons*.

The following is a brief description of the evaluation procedure used by CALA. The detailed evaluation procedure is described in PT15-03 - *CALA PT Program - Procedures*, which is available on the CALA website.

3.1 Homogeneity and Stability Assessment

Homogeneity and stability are assessed using participant data. Regression analysis is performed on reported result against order of sample production (Homogeneity) and reported result against date of analysis (Stability). If the slope is significantly different than zero for either then the Standard Deviation of Proficiency Assessment (s) is increased until the impact is minimized.

3.2 The z score

A "z-score" is calculated for each reported result as follows:

$$z = \frac{(x - \bar{X})}{s}$$

where: x = participant's result;

\bar{X} = the Assigned Value for the sample;

s = the Standard Deviation for Proficiency Assessment.

The assigned value \bar{X} is generally estimated from the inter-laboratory Robust mean after outliers due to obvious gross errors (e.g., reported in wrong units) have been removed.

The Standard Deviation for Proficiency Assessment, s , is determined as follows:

1. The inter-laboratory Robust standard deviation (stdev) is calculated using reported results, obvious outliers removed;
2. The expected inter-laboratory standard deviation ($s!$) is estimated from regression equations derived from previous studies (see PT15-05-CALA PT Program – *Regression Equations* for details);
3. If $s!$ is higher than stdev then $s!$ is used in the z score equation;
4. If $s!$ is lower than stdev then stdev is used in the z score equation;
5. When a laboratory reports its detection limit, s will be estimated using a pooled variance procedure that uses both the inter-laboratory data and the reported detection limit.

3.2 Composite (PT) Score

Since each PT study involves four or two separate samples of distinct concentrations for each test, it is necessary to calculate a composite PT score for each test to determine overall performance. The composite score is calculated by first averaging the absolute z-scores for the four results and then calculating a final score as $100 + (-15 \times \text{avg } |z|)$.

Acceptable PT Scores equal or exceed 70.

3.3 Identifying Bias

The proficiency testing report provides flags for bias. These are determined using the re-scaled z-score procedure.

$$RSZ = \frac{\sum z}{\sqrt{N}}$$

where z = the z- score
 N = the number of samples

Flags are assigned for each test group/parameter combination as follows:

$RSZ \geq -2$ and ≤ 2	no flag assigned
$RSZ > 2$	H (High)
$RSZ > 3$	VH (Very High)
$RSZ < -2$	L (LOW)
$RSZ < -3$	VL (Very Low)

3.4 Deviations from Evaluation Procedure

Other than changes to the Standard Deviation of Proficiency Assessment due to homogeneity or stability flags, any deviation from the published evaluation procedure is described on the cover page(s) of the final PT report.

4.0 STUDY SPECIFIC DATA SUMMARY

The following pages provide more detailed information about the study indicated in the cover page of this report than is found in the participant-specific CALA Proficiency Testing Report. The graphical representations and the statistical summaries by method are based upon the data after outliers have been removed.

4.1 Overall Data Distribution

Kernel density plots are generated for each data set. These plots are a statistical way to represent the overall data distribution and are used to visualize deviations from normality and bi-modality.

4.2 z-Score Plots

The z-scores for each sample are ranked in increasing order and plotted. When the data is normally distributed, the plot should show a slight sigmoidal curve, with an equal number of points above zero as below.

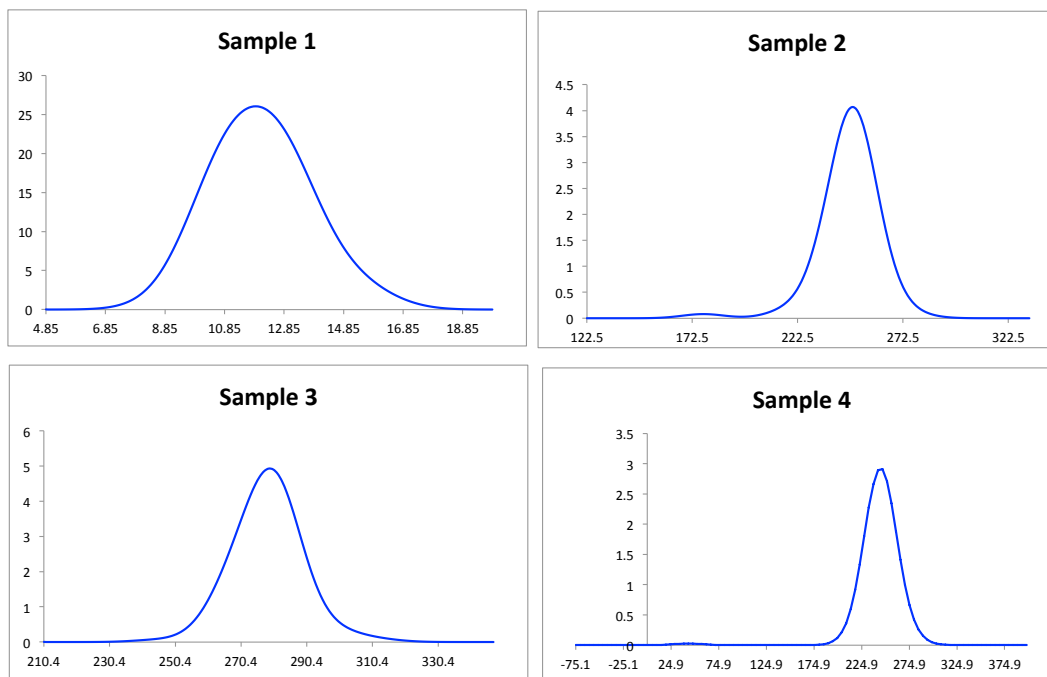
4.3 Statistical Summary by Method

Statistical summaries are provided for the four most commonly reported methods. The statistics included in these tables for mean and standard deviation are the mathematical values, not the robust values. As such, there will be slight differences between these and those displayed in the participant specific CALA Proficiency Testing Report.

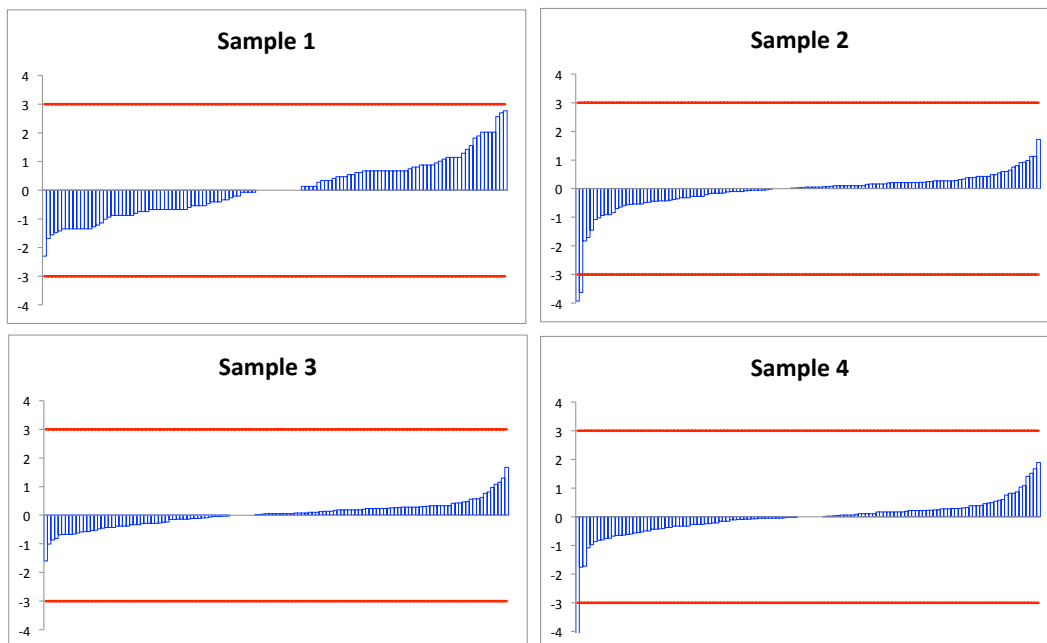
In addition to this, z-Score plots are provided for the four most common methods. As these plots use the Assigned Value and Standard Deviation for Proficiency Assessment estimated using all of the data, any method that does not have approximately the same number of positive and negative z-scores is an indication that the method may be biased relative to other methods.

Alkalinity (pH 4.5)

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	TITR	TITR-A	CLR-A	COLOR
Median	12	12	11.2	13.1	15
Stdev	1.48	1.34	1.38	1.33	1.69
Number	122	70	41	6	5
z >3	0	0	0	0	0
z 2 - 3	8	3	2	0	3

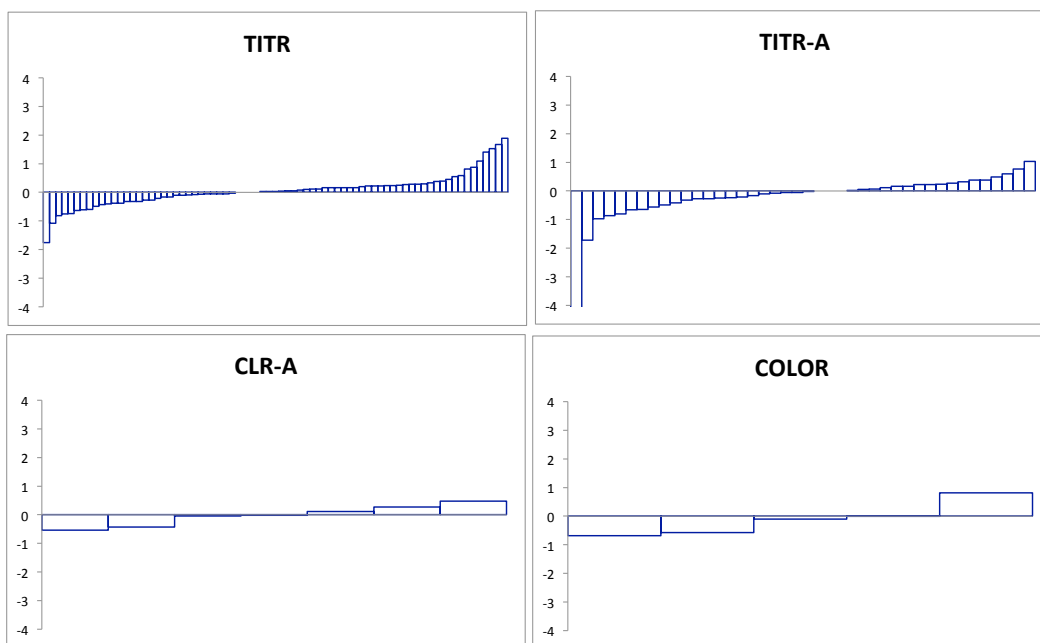
Sample 2					
Method	All*	TITR	TITR-A	CLR-A	COLOR
Median	248	250	248	248	245
Stdev	18.6	12.5	13.6	12.5	12.8
Number	130	75	42	7	5
z >3	2	1	1	0	0
z 2 - 3	0	0	0	0	0

Sample 3					
Method	All*	TITR	TITR-A	CLR-A	COLOR
Median	278	280	279	278	272
Stdev	20.9	9.44	9.46	8.02	9.29
Number	130	75	42	7	5
z >3	0	0	0	0	0
z 2 - 3	0	0	0	0	0

Sample 4					
Method	All*	TITR	TITR-A	CLR-A	COLOR
Median	245	246	244	245	243
Stdev	18.4	10.5	32.2	6.66	10.9
Number	130	75	42	7	5
z >3	1	0	1	0	0
z 2 - 3	0	0	0	0	0

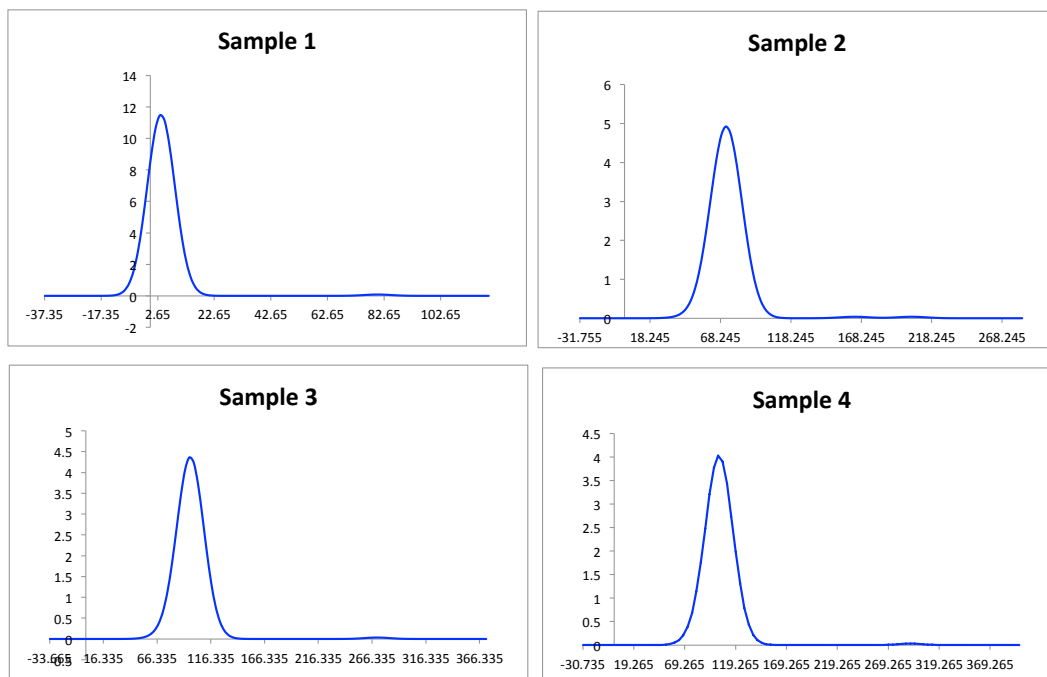
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

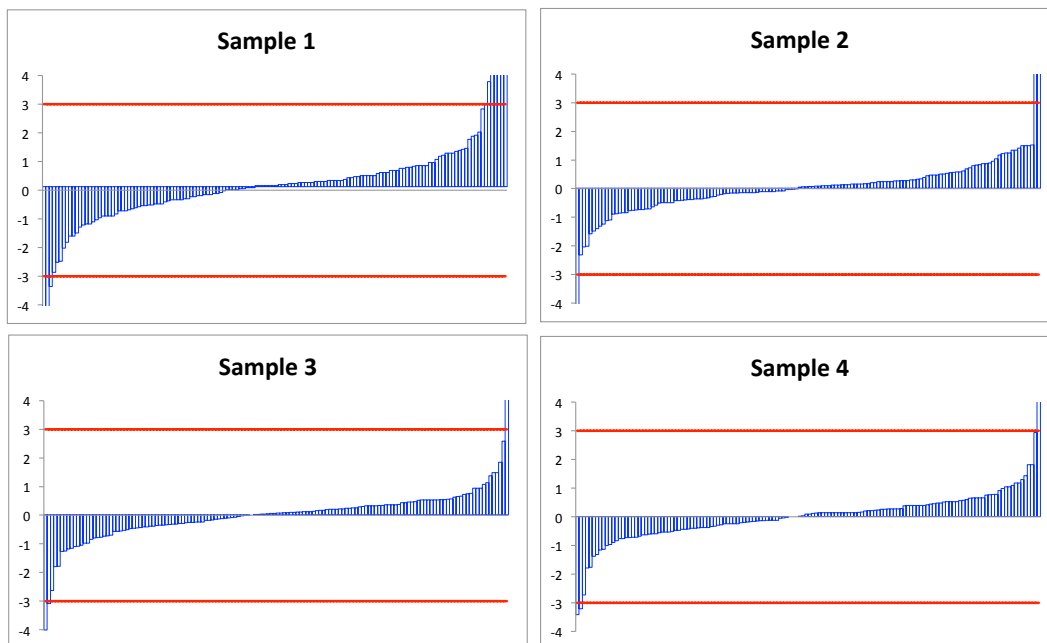


Calcium

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	3.79	3.83	3.76	3.88	3.67
Stdev	0.284	8.89	0.313	0.815	0.314
Number	142	75	46	10	5
z >3	9	5	1	2	0
z 2 - 3	6	2	2	1	0

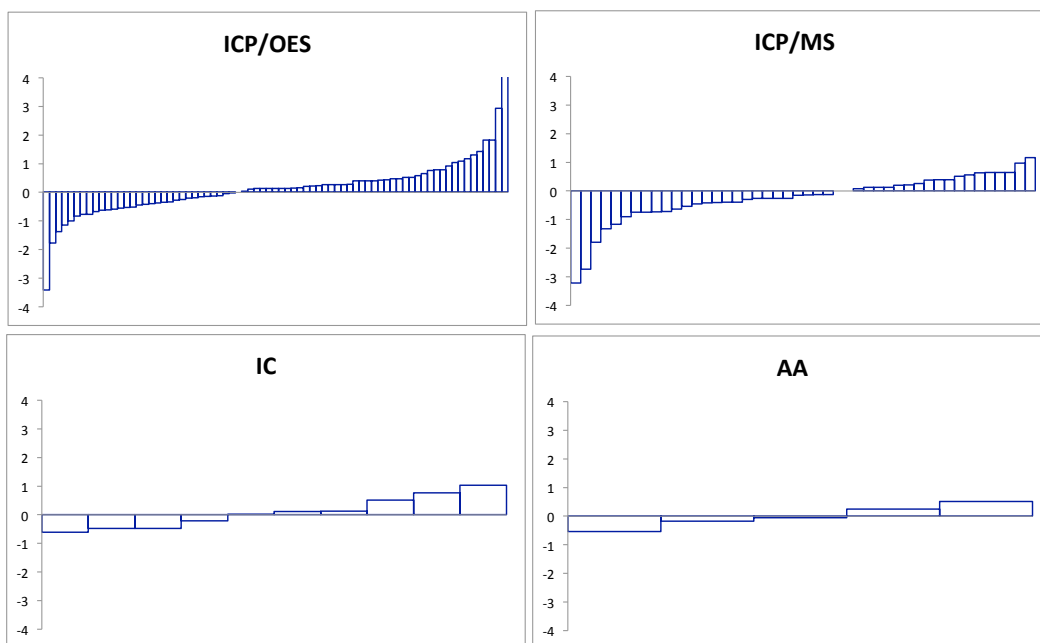
Sample 2					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	72.2	72.9	71.6	72	73.5
Stdev	5.42	19	3.72	3.97	3.19
Number	142	75	46	10	5
z >3	3	3	0	0	0
z 2 - 3	3	1	2	0	0

Sample 3					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	97.2	98	96.9	97.6	95.4
Stdev	7.29	20.9	6.47	3.53	4.55
Number	142	75	46	10	5
z >3	3	2	1	0	0
z 2 - 3	2	0	2	0	0

Sample 4					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	103	104	102	103	103
Stdev	7.73	22.6	6.48	4.28	3.12
Number	142	75	46	10	5
z >3	3	2	1	0	0
z 2 - 3	2	1	1	0	0

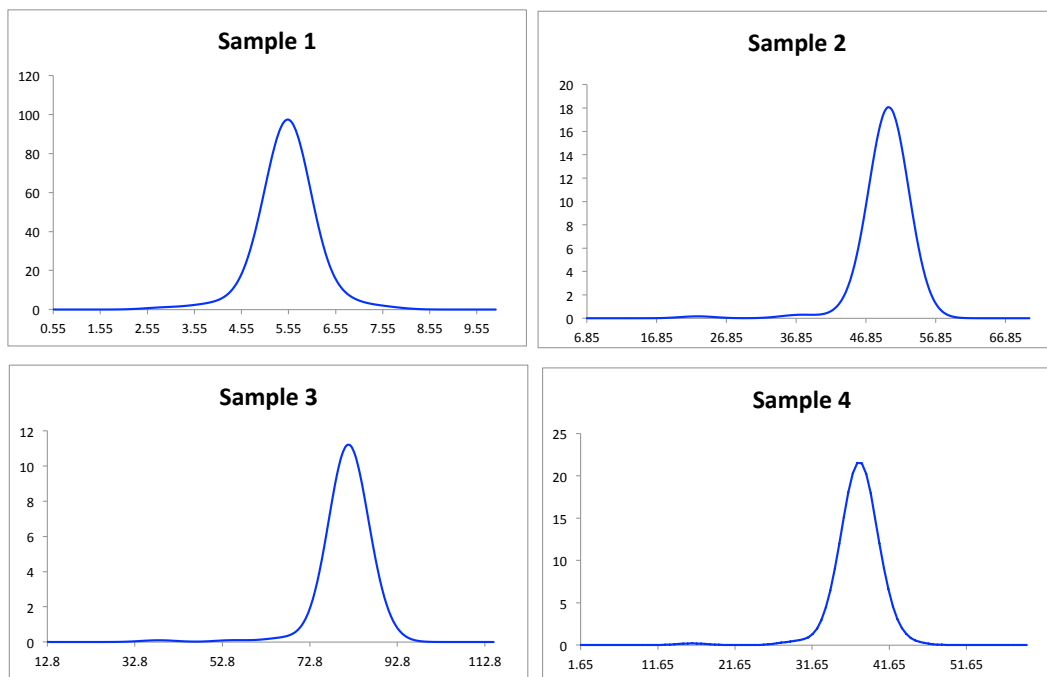
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

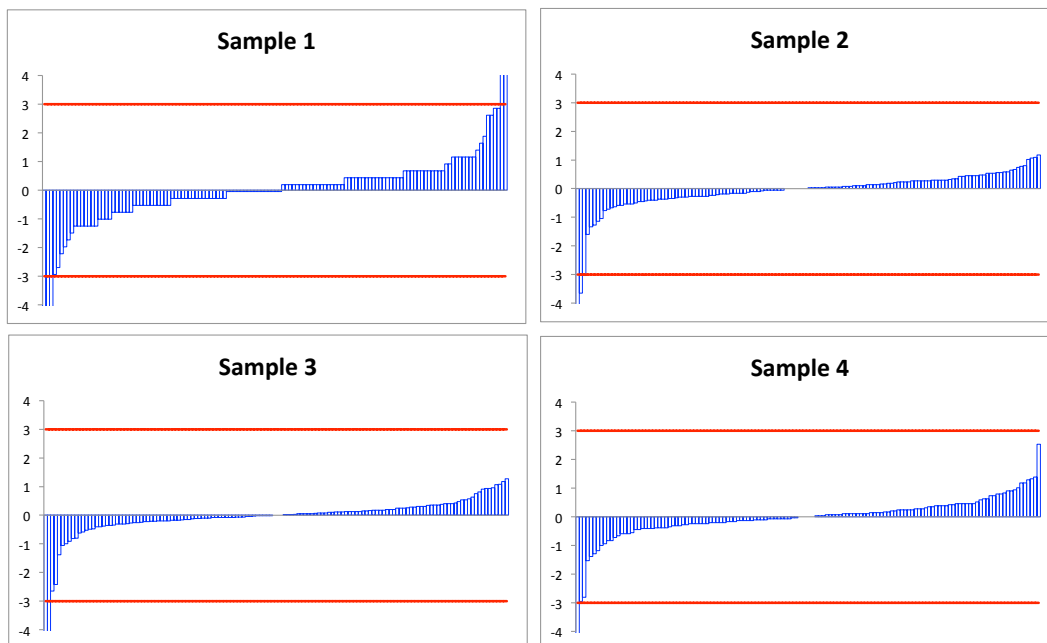


Chloride

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	IC	TITR	COLOR	CLR-A
Median	5.52	5.5	5.75	5.7	5.3
Stdev	0.414	0.367	0.736	1.1	0.876
Number	134	98	14	11	9
z >3	5	1	1	2	1
z 2 - 3	7	3	2	1	1

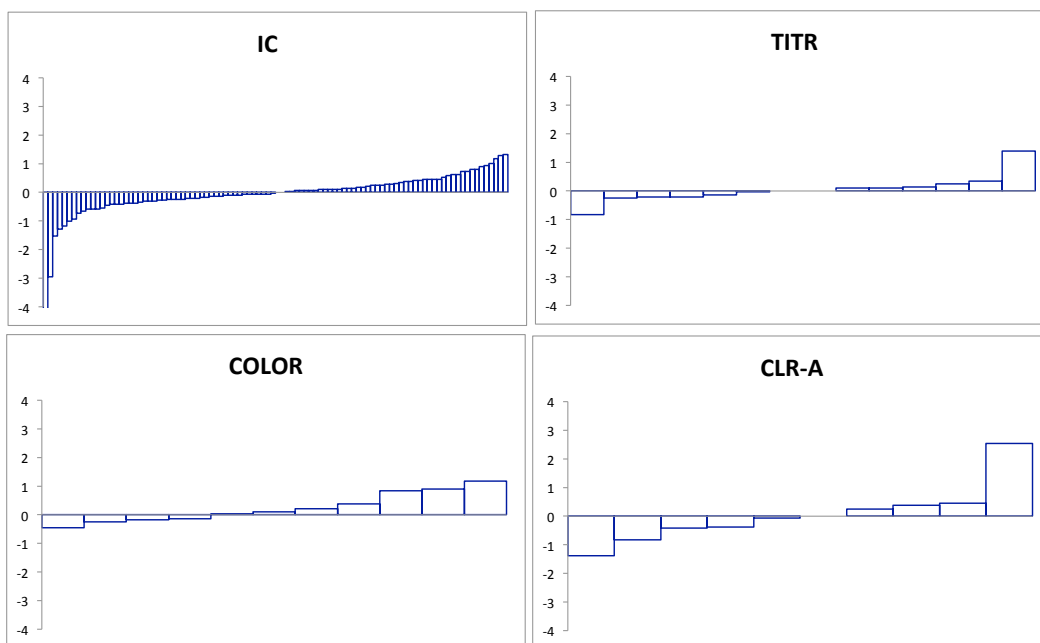
Sample 2					
Method	All*	IC	TITR	COLOR	CLR-A
Median	50	50.1	49.8	50.1	50.1
Stdev	3.75	3.41	2.28	1.58	1.93
Number	136	98	14	11	10
z >3	3	2	0	0	0
z 2 - 3	0	0	0	0	0

Sample 3					
Method	All*	IC	TITR	COLOR	CLR-A
Median	81.5	81.6	81	82.3	81.2
Stdev	6.12	5.77	4.65	1.79	2.71
Number	136	98	14	11	10
z >3	2	2	0	0	0
z 2 - 3	2	0	1	0	0

Sample 4					
Method	All*	IC	TITR	COLOR	CLR-A
Median	37.7	37.7	37.7	38	37.6
Stdev	2.88	2.77	1.38	1.52	3
Number	136	98	14	11	10
z >3	1	1	0	0	0
z 2 - 3	3	1	0	0	1

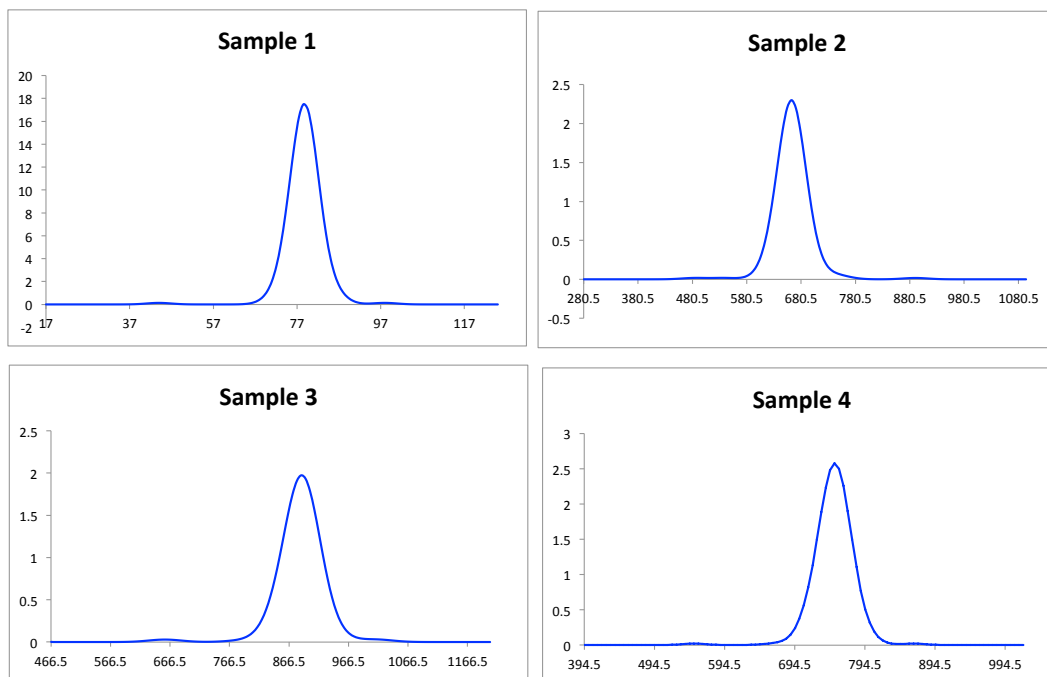
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

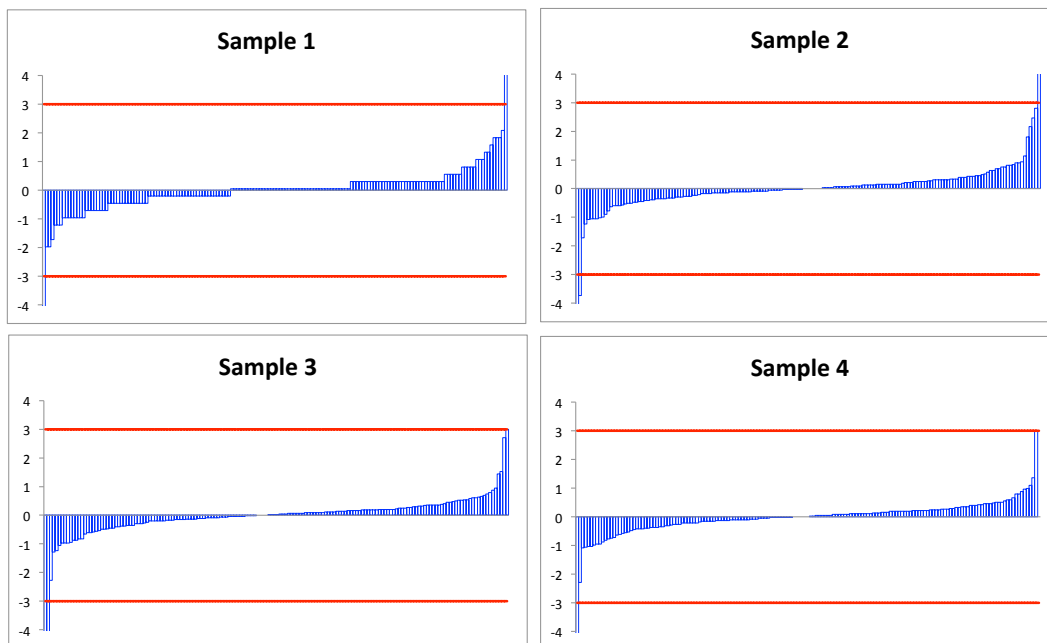


Conductivity (25 °C)

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	C-MTR	CA-MTR		
Median	78.8	79	79	0	0
Stdev	3.94	4.19	1.48	0	0
Number	163	144	19	0	0
z >3	2	2	0	0	0
z 2 - 3	1	1	0	0	0

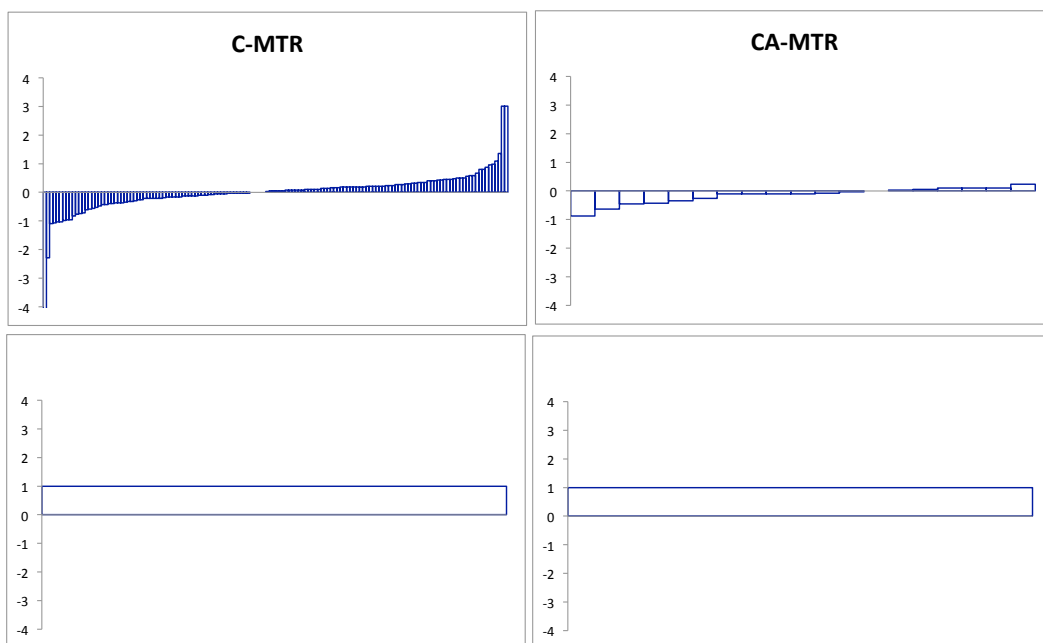
Sample 2					
Method	All*	C-MTR	CA-MTR		
Median	663	663	661	0	0
Stdev	33.2	32.8	12.8	0	0
Number	164	145	19	0	0
z >3	3	3	0	0	0
z 2 - 3	3	3	0	0	0

Sample 3					
Method	All*	C-MTR	CA-MTR		
Median	887	889	888	0	0
Stdev	44.4	37.6	12.8	0	0
Number	164	145	19	0	0
z >3	2	2	0	0	0
z 2 - 3	3	3	0	0	0

Sample 4					
Method	All*	C-MTR	CA-MTR		
Median	751	753	747	0	0
Stdev	37.6	27.7	10.7	0	0
Number	163	144	19	0	0
z >3	3	3	0	0	0
z 2 - 3	1	1	0	0	0

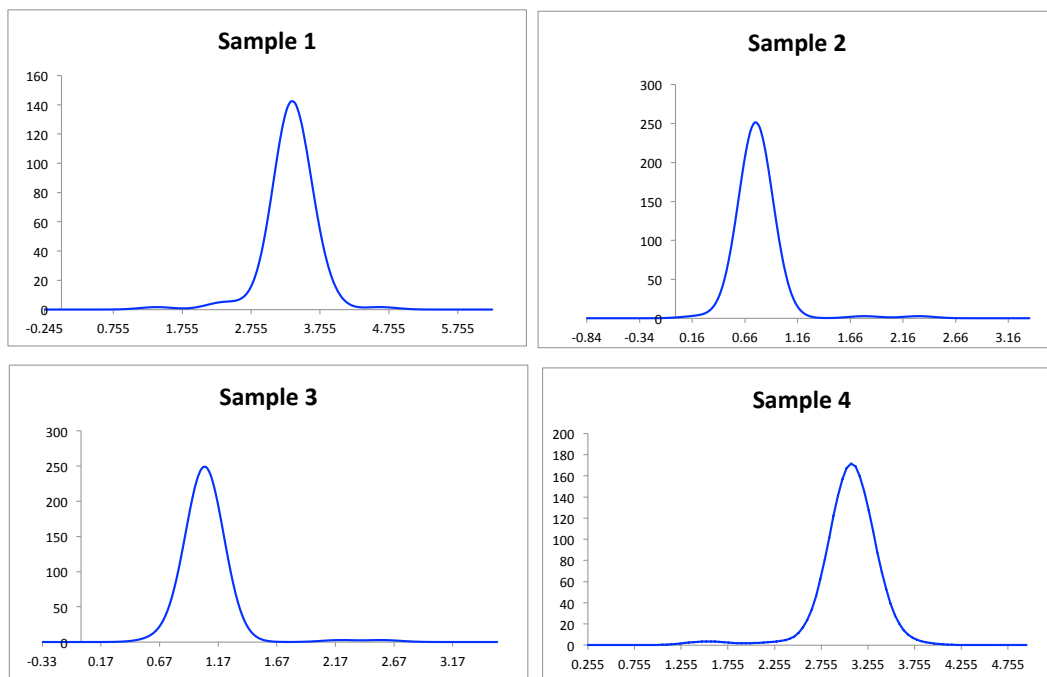
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

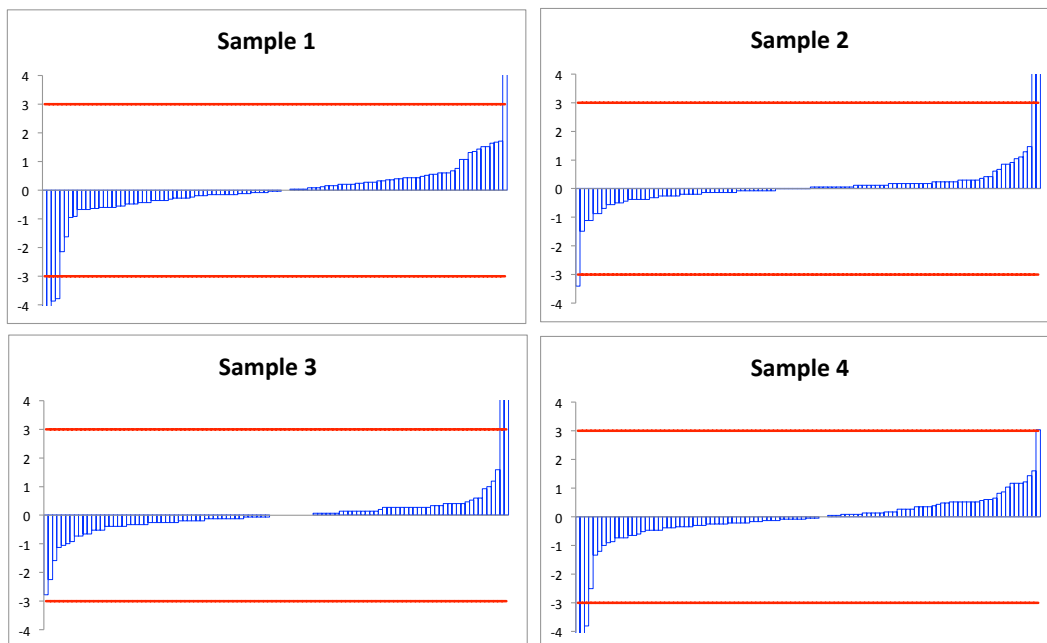


Fluoride

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	IC	SIE	COLOR	TITR
Median	3.35	3.35	3.33	3.38	3.19
Stdev	0.251	0.272	0.249	0.756	0
Number	107	69	29	8	1
z >3	5	3	1	1	0
z 2 - 3	1	0	0	1	0

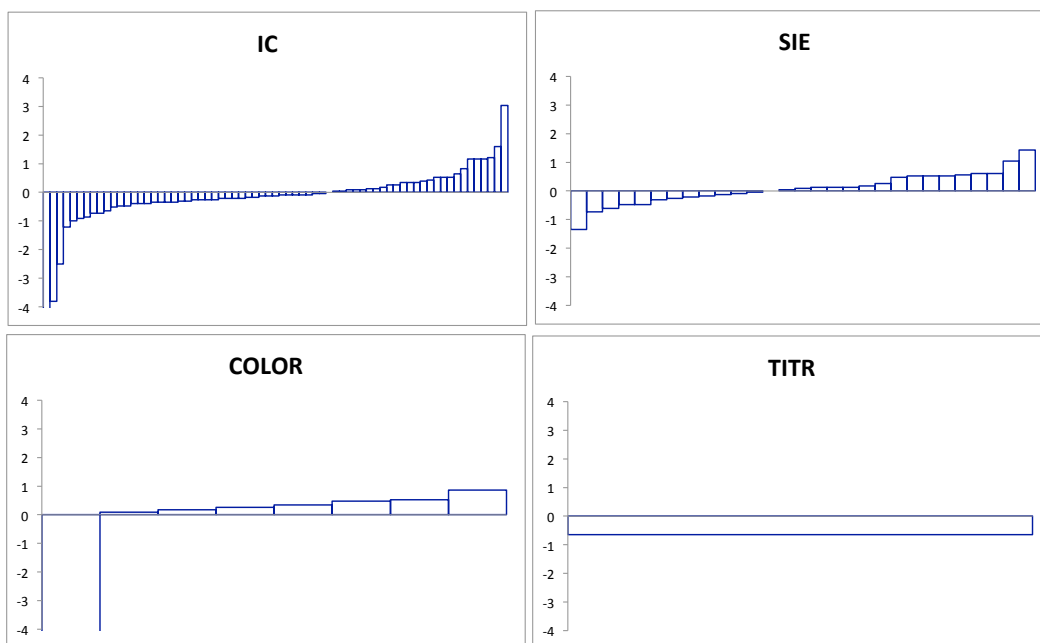
Sample 2					
Method	All*	IC	SIE	COLOR	TITR
Median	0.762	0.75	0.78	0.925	0.74
Stdev	0.162	0.094	0.0439	0.548	0
Number	107	69	29	8	1
z >3	3	1	0	2	0
z 2 - 3	0	0	0	0	0

Sample 3					
Method	All*	IC	SIE	COLOR	TITR
Median	1.06	1.04	1.07	1.17	1
Stdev	0.151	0.0909	0.0473	0.596	0
Number	107	69	29	8	1
z >3	2	0	0	2	0
z 2 - 3	2	2	0	0	0

Sample 4					
Method	All*	IC	SIE	COLOR	TITR
Median	3.08	3.05	3.1	3.15	2.93
Stdev	0.231	0.259	0.128	0.618	0
Number	107	69	29	8	1
z >3	4	3	0	1	0
z 2 - 3	1	1	0	0	0

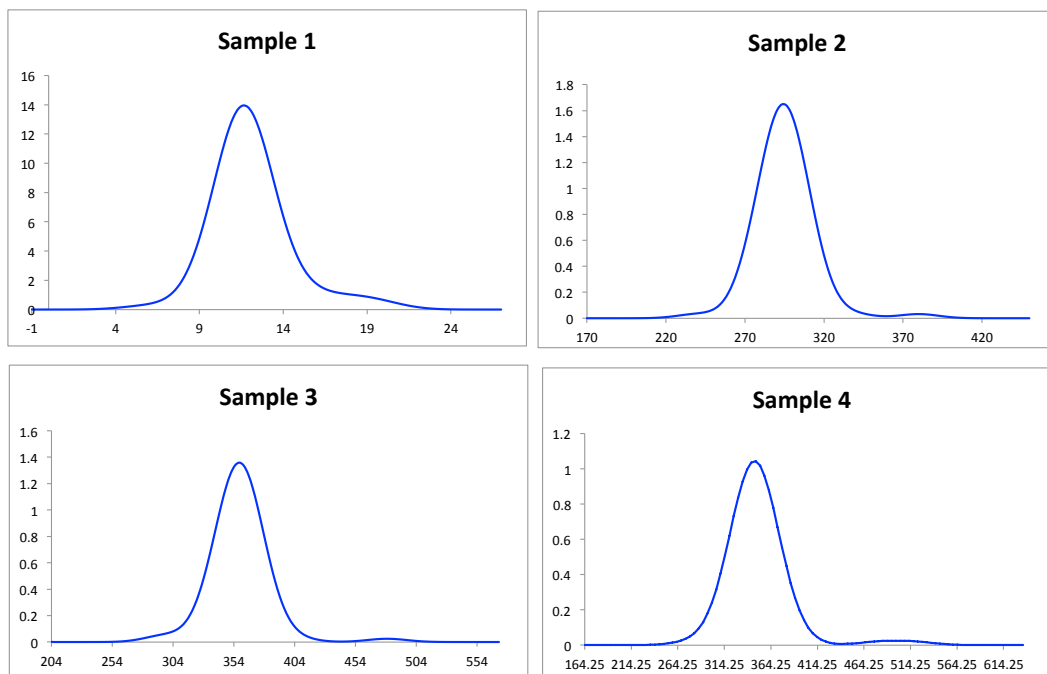
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

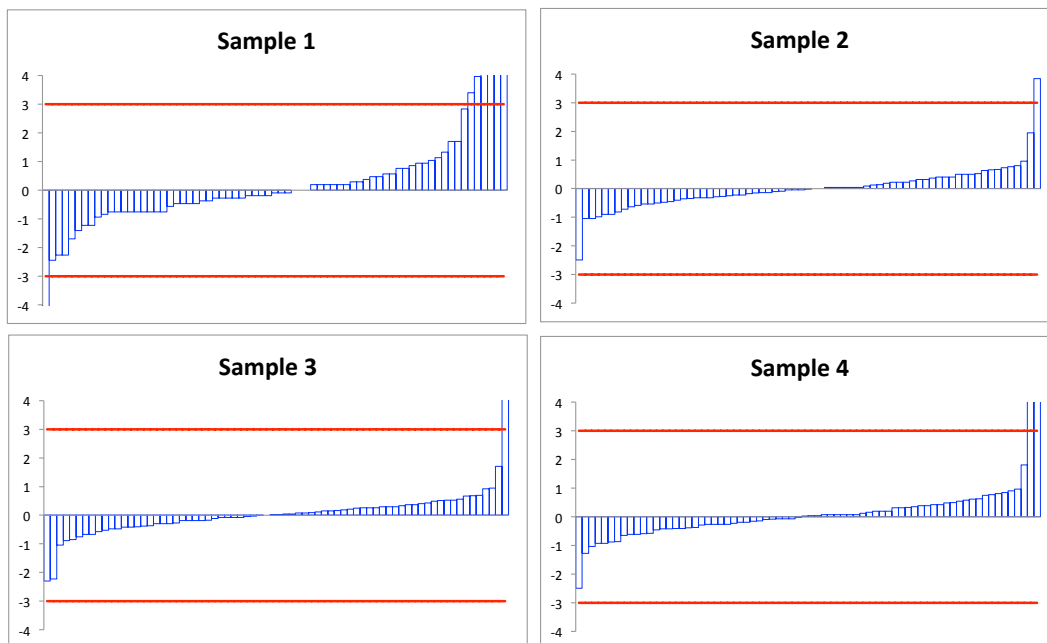


Hardness (as CaCO₃)

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	CALC	TITR	TITR-A	CALC(ICP)
Median	11.8	11.6	12.7	11	11.5
Stdev	1.06	1.53	2.72	0	0
Number	71	48	20	2	1
z >3	7	2	5	0	0
z 2 - 3	4	3	1	0	0

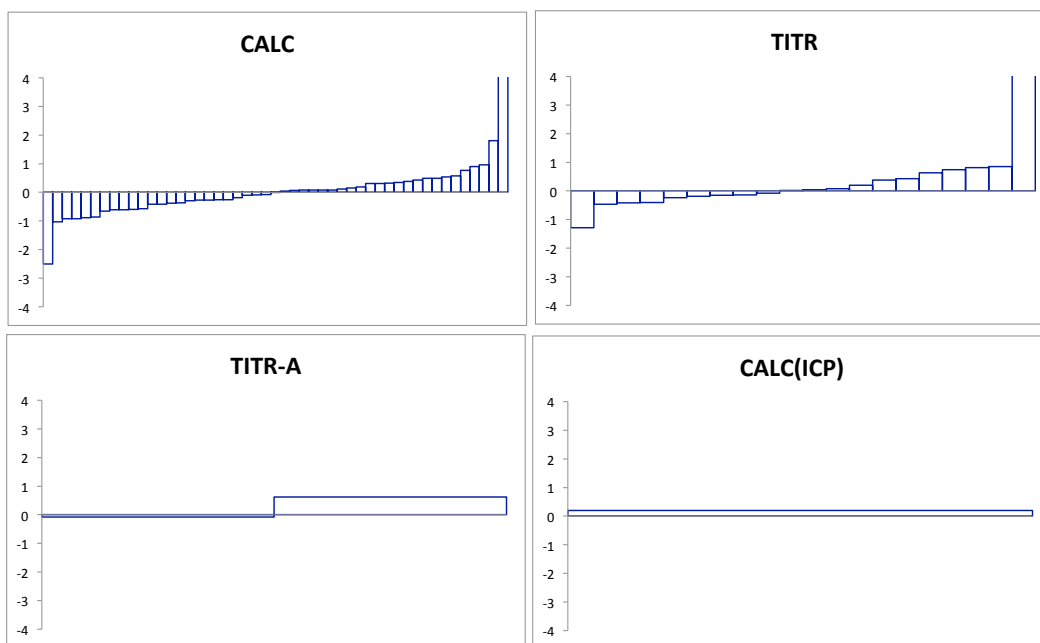
Sample 2					
Method	All*	CALC	TITR	TITR-A	CALC(ICP)
Median	295	293	296	295	298
Stdev	22.1	14.8	21.2	1.41	0
Number	71	48	20	2	1
z >3	1	0	1	0	0
z 2 - 3	1	1	0	0	0

Sample 3					
Method	All*	CALC	TITR	TITR-A	CALC(ICP)
Median	358	356	362	360	365
Stdev	26.9	17.7	29.1	1.41	0
Number	72	49	20	2	1
z >3	1	0	1	0	0
z 2 - 3	2	2	0	0	0

Sample 4					
Method	All*	CALC	TITR	TITR-A	CALC(ICP)
Median	347	347	348	354	352
Stdev	26	30	32.4	12.7	0
Number	72	49	20	2	1
z >3	2	1	1	0	0
z 2 - 3	1	1	0	0	0

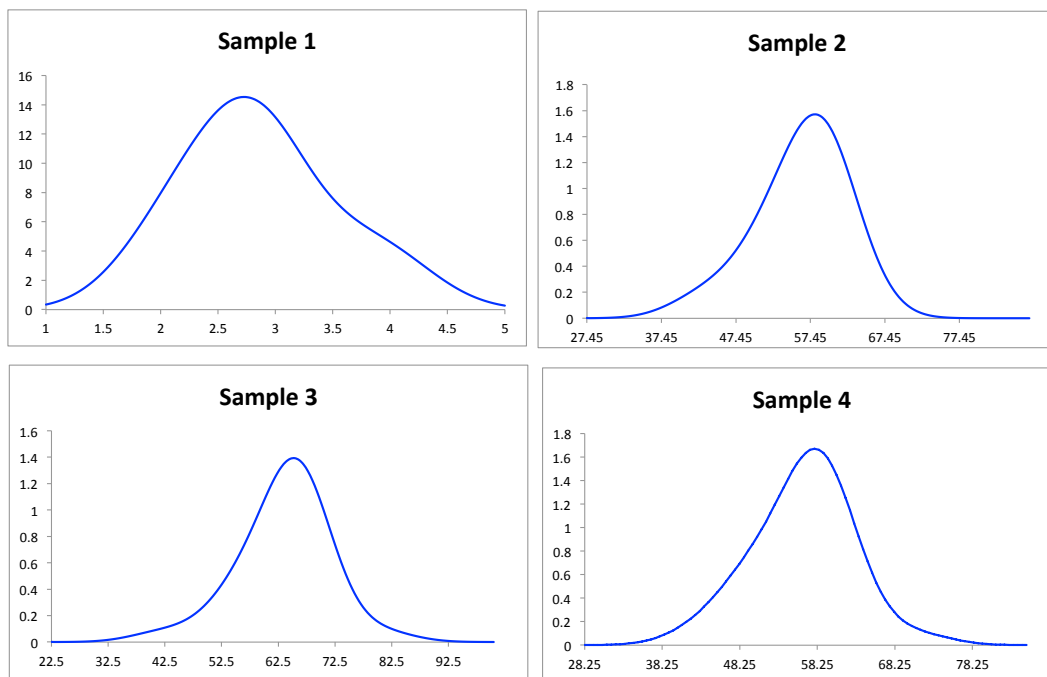
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

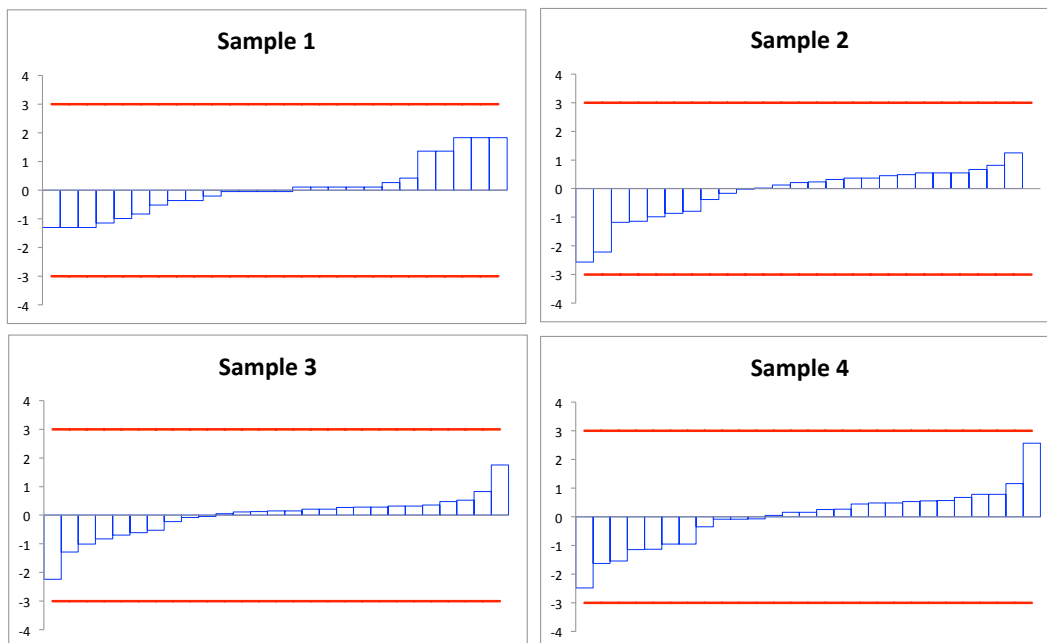


Inorganic Carbon

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	INFRARED	CALC	CLR-A	
Median	2.83	2.85	2.6	2	0
Stdev	0.637	0.604	0	0	0
Number	26	24	1	1	0
z >3	0	0	0	0	0
z 2 - 3	0	0	0	0	0

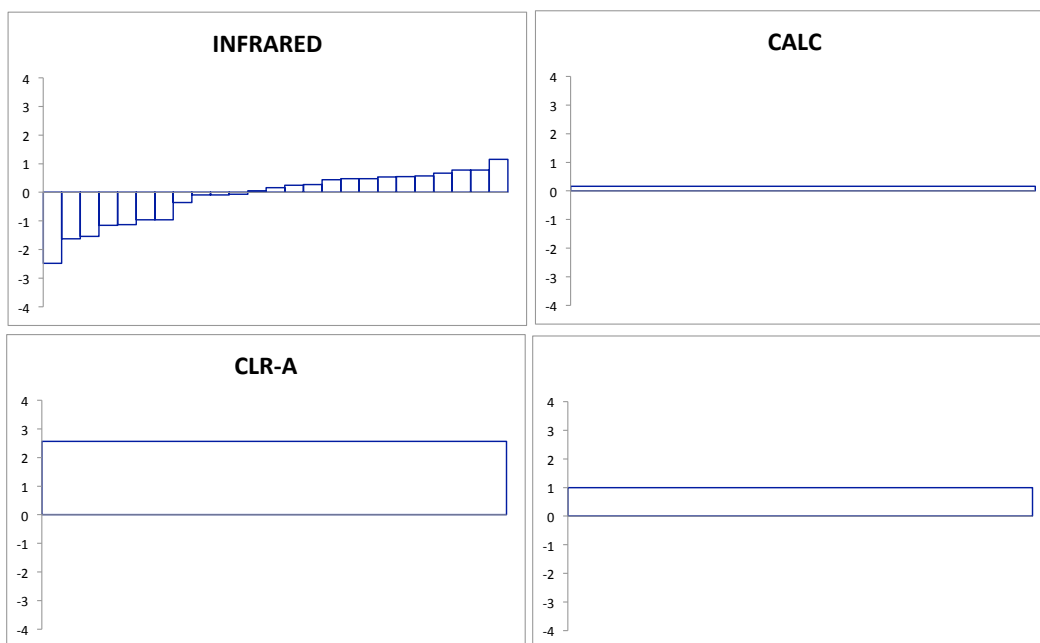
Sample 2					
Method	All*	INFRARED	CALC	CLR-A	
Median	56.9	57.9	59	72	0
Stdev	5.69	5.37	0	0	0
Number	26	24	1	1	0
z >3	0	0	0	0	0
z 2 - 3	3	2	0	1	0

Sample 3					
Method	All*	INFRARED	CALC	CLR-A	
Median	63.9	65.1	66	81	0
Stdev	9.76	6.63	0	0	0
Number	27	25	1	1	0
z >3	0	0	0	0	0
z 2 - 3	1	1	0	0	0

Sample 4					
Method	All*	INFRARED	CALC	CLR-A	
Median	56.5	57.4	57.4	71	0
Stdev	5.65	5.16	0	0	0
Number	27	25	1	1	0
z >3	0	0	0	0	0
z 2 - 3	2	1	0	1	0

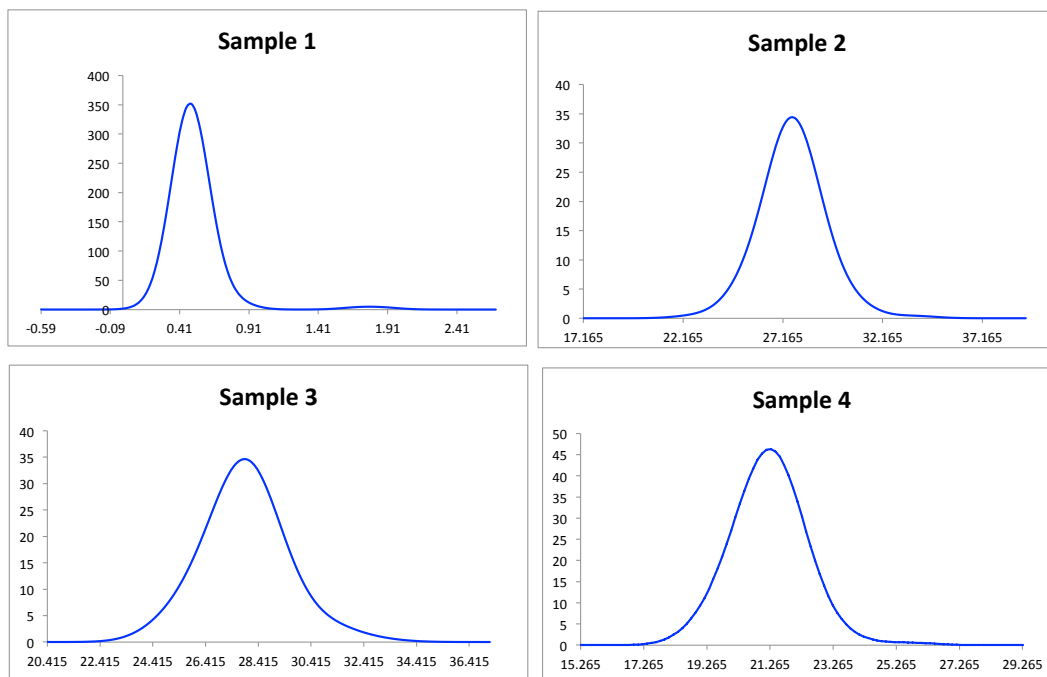
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

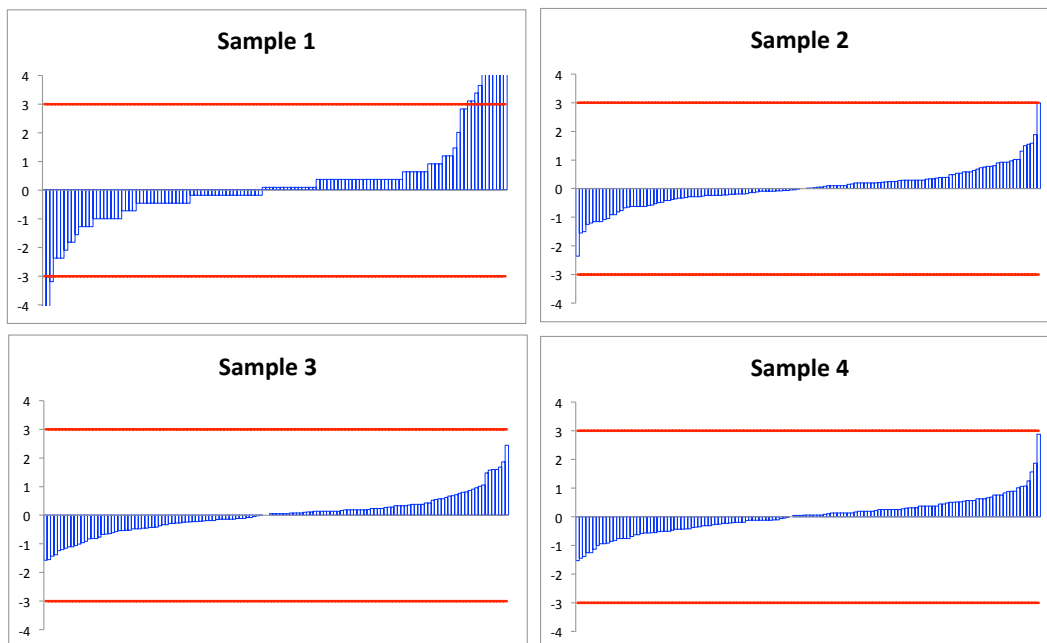


Magnesium

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	0.487	0.49	0.48	0.485	0.49
Stdev	0.0365	0.18	0.0593	0.164	0.0515
Number	129	67	45	10	6
z >3	14	7	3	3	0
z 2 - 3	6	2	1	2	1

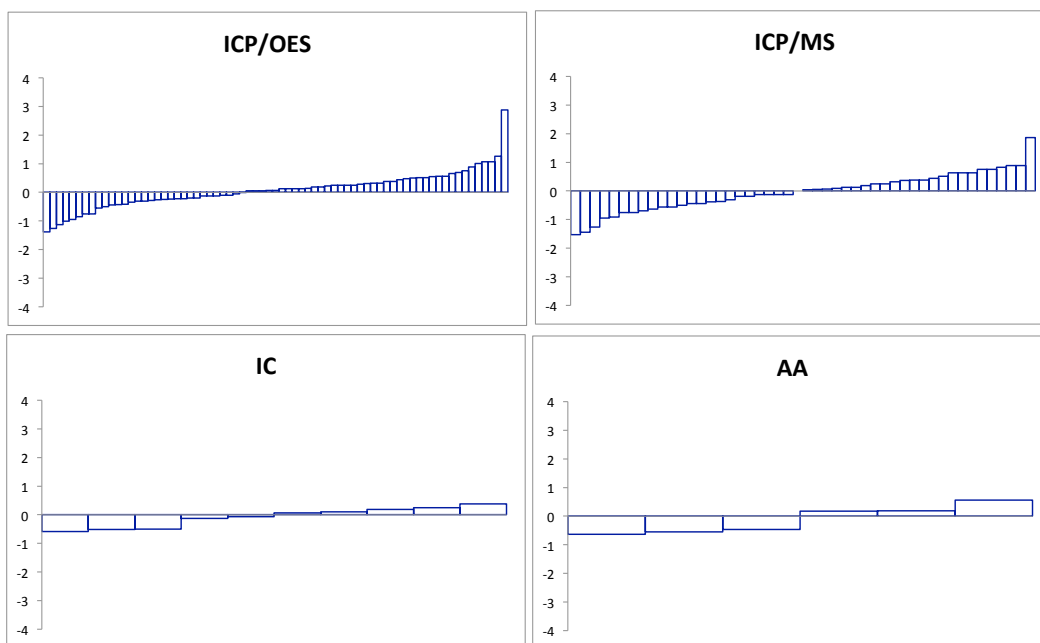
Sample 2					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	27.6	27.8	27.5	27.6	27.6
Stdev	2.07	1.14	1.46	1.33	2.94
Number	137	71	48	10	6
z >3	0	0	0	0	0
z 2 - 3	2	0	0	0	1

Sample 3					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	27.9	28	27.9	27.8	28
Stdev	2.09	1.19	1.58	0.876	2.52
Number	138	72	48	10	6
z >3	0	0	0	0	0
z 2 - 3	1	0	0	0	1

Sample 4					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	21.2	21.3	21.2	21.2	21
Stdev	1.59	1.02	1.06	0.549	0.781
Number	137	71	48	10	6
z >3	0	0	0	0	0
z 2 - 3	1	1	0	0	0

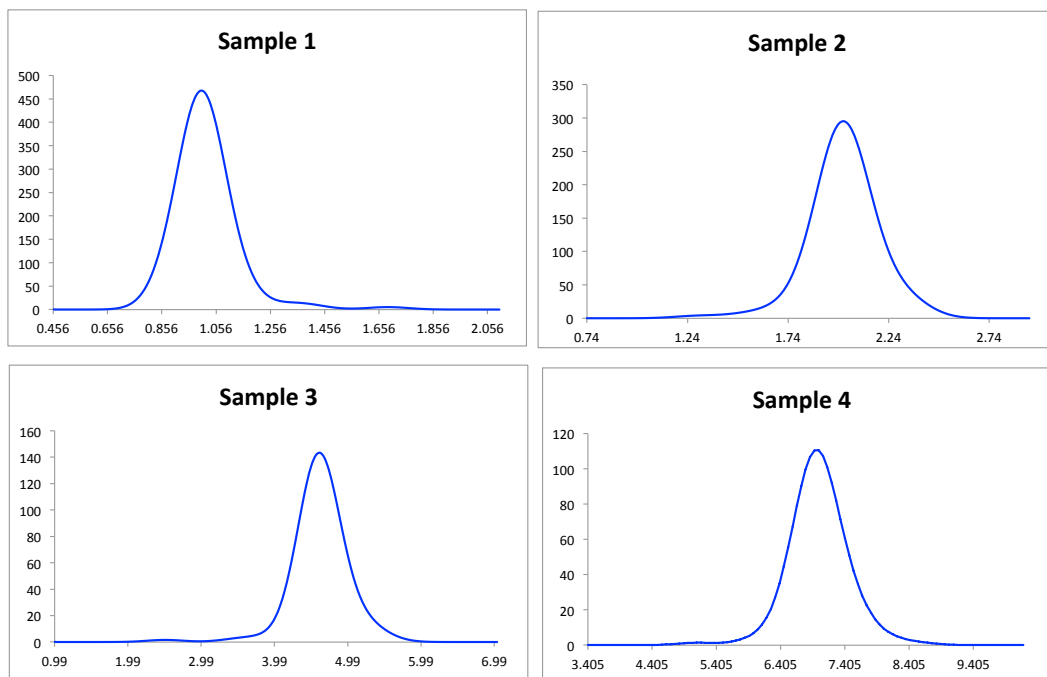
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

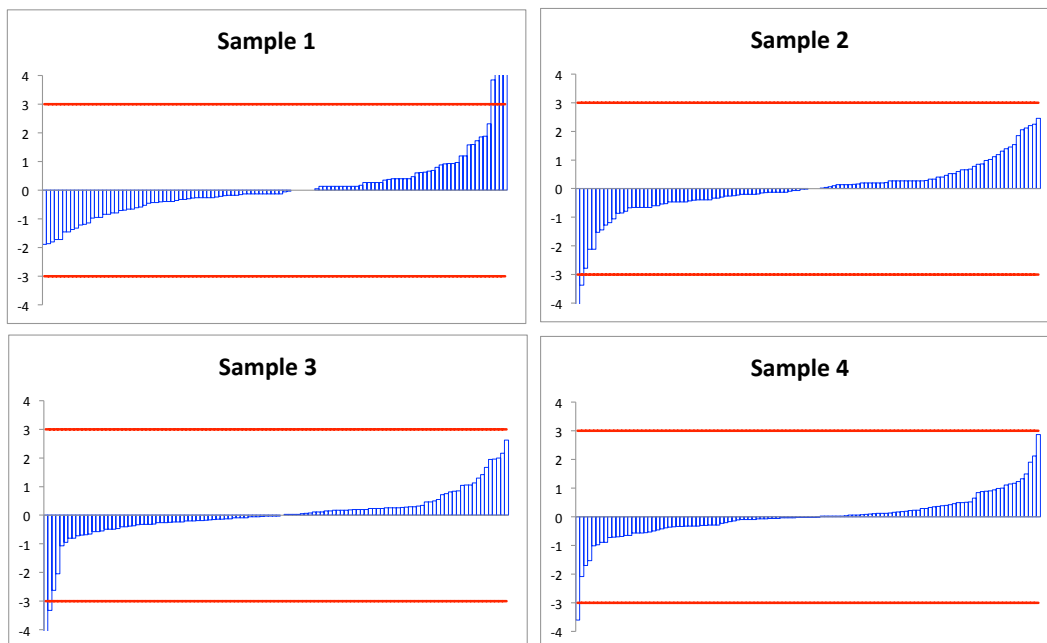


Nitrate

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	IC	COLOR	CLR-A	
Median	1.01	1	1.08	0.975	0
Stdev	0.0754	0.0713	0.199	0.0567	0
Number	116	86	16	14	0
z >3	4	2	2	0	0
z 2 - 3	1	1	0	0	0

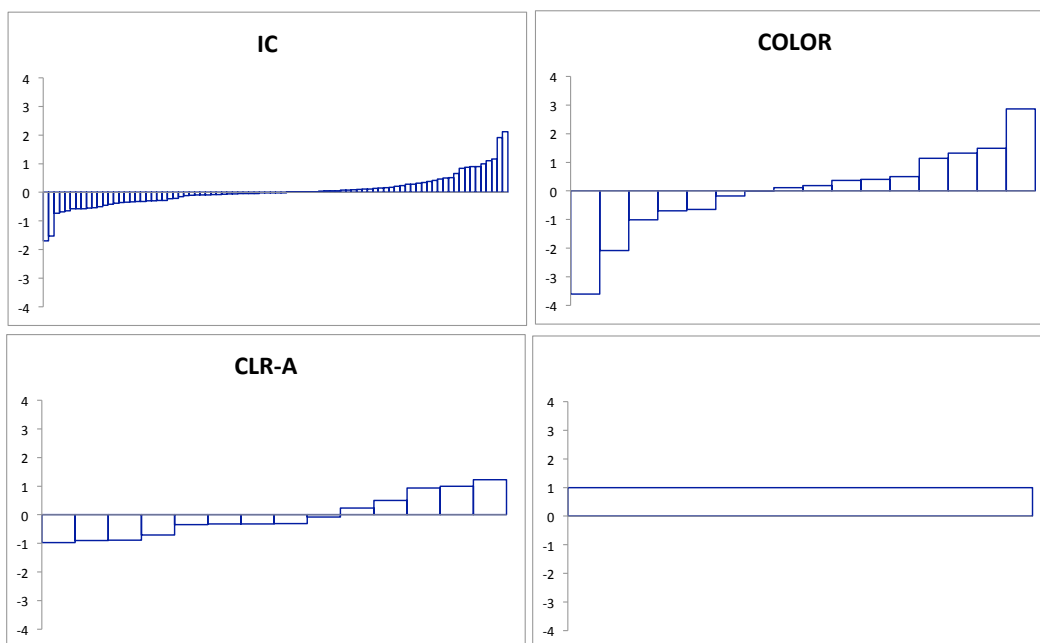
Sample 2					
Method	All*	IC	COLOR	CLR-A	
Median	2.02	2.01	2.1	1.96	0
Stdev	0.151	0.14	0.233	0.0802	0
Number	116	86	16	14	0
z >3	2	2	0	0	0
z 2 - 3	8	2	6	0	0

Sample 3					
Method	All*	IC	COLOR	CLR-A	
Median	4.61	4.6	4.71	4.55	0
Stdev	0.346	0.246	0.692	0.226	0
Number	116	86	16	14	0
z >3	2	1	1	0	0
z 2 - 3	4	2	2	0	0

Sample 4					
Method	All*	IC	COLOR	CLR-A	
Median	6.99	6.98	7.07	6.83	0
Stdev	0.524	0.295	0.781	0.387	0
Number	116	86	16	14	0
z >3	1	0	1	0	0
z 2 - 3	3	1	2	0	0

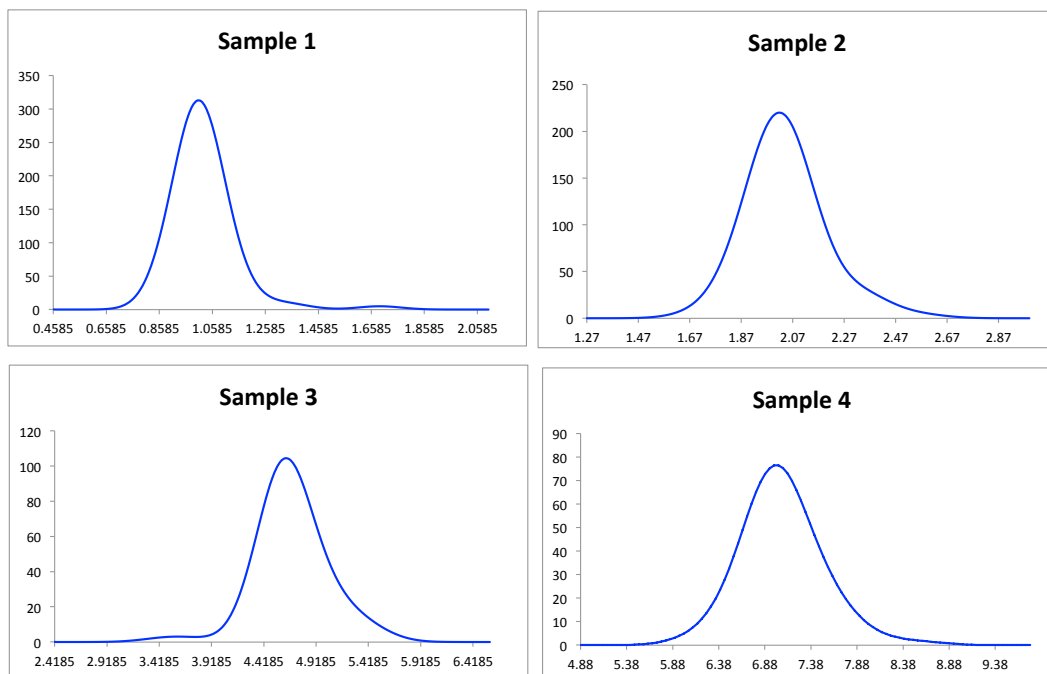
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

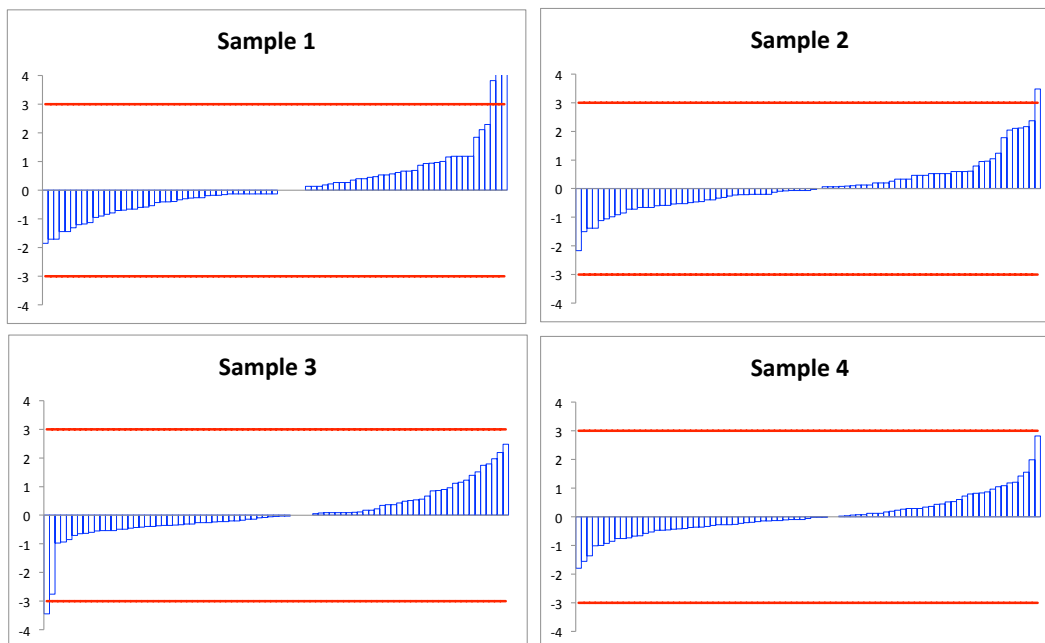


Nitrate plus Nitrite

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	IC	CLR-A	COLOR	CALC
Median	1.01	1	1	1.04	1.02
Stdev	0.0759	0.0961	0.0555	0.158	0
Number	83	32	26	24	1
z >3	3	2	0	1	0
z 2 - 3	2	1	0	1	0

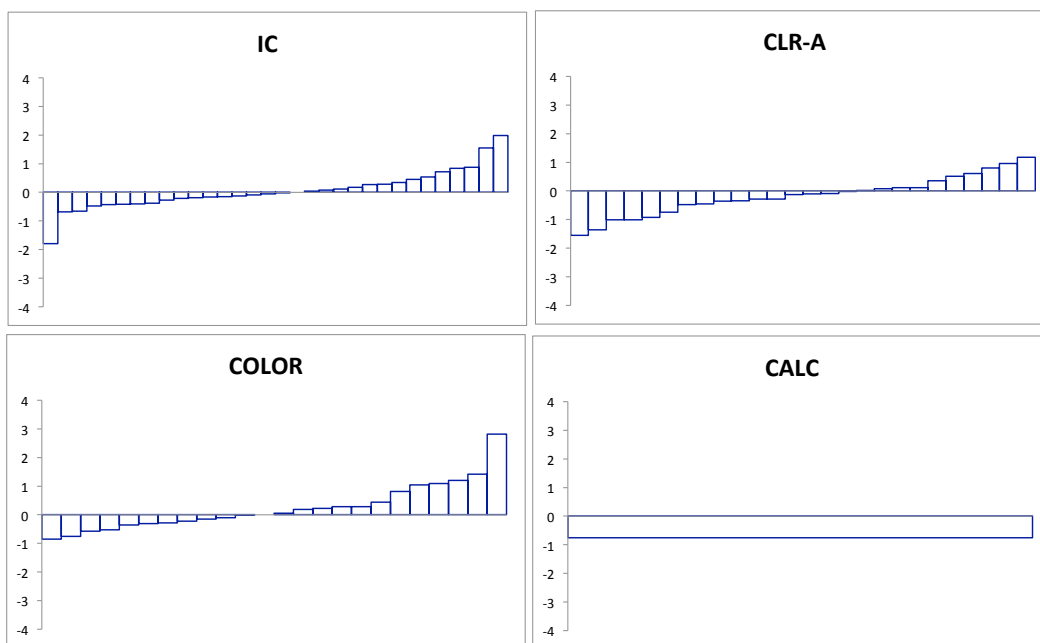
Sample 2					
Method	All*	IC	CLR-A	COLOR	CALC
Median	2.03	2.02	2.02	2.09	2.03
Stdev	0.152	0.118	0.128	0.178	0
Number	83	32	26	24	1
z >3	1	0	1	0	0
z 2 - 3	6	2	0	4	0

Sample 3					
Method	All*	IC	CLR-A	COLOR	CALC
Median	4.67	4.59	4.65	4.72	4.69
Stdev	0.351	0.346	0.205	0.332	0
Number	83	32	26	24	1
z >3	1	1	0	0	0
z 2 - 3	3	1	0	2	0

Sample 4					
Method	All*	IC	CLR-A	COLOR	CALC
Median	7.05	7.03	6.99	7.06	6.65
Stdev	0.528	0.359	0.359	0.437	0
Number	83	32	26	24	1
z >3	0	0	0	0	0
z 2 - 3	1	0	0	1	0

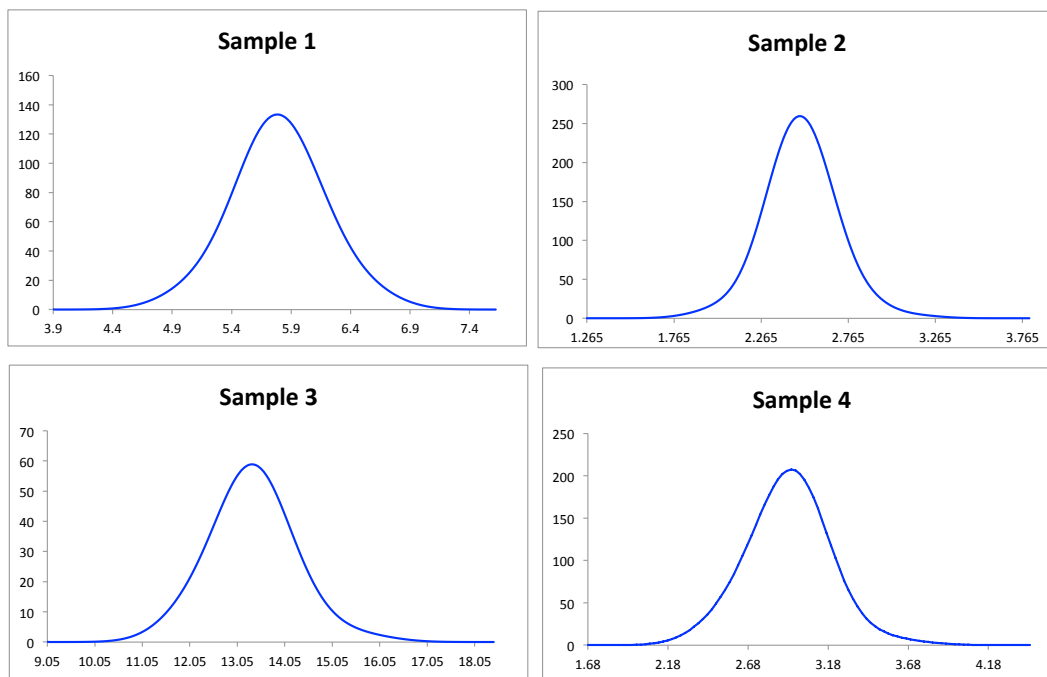
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

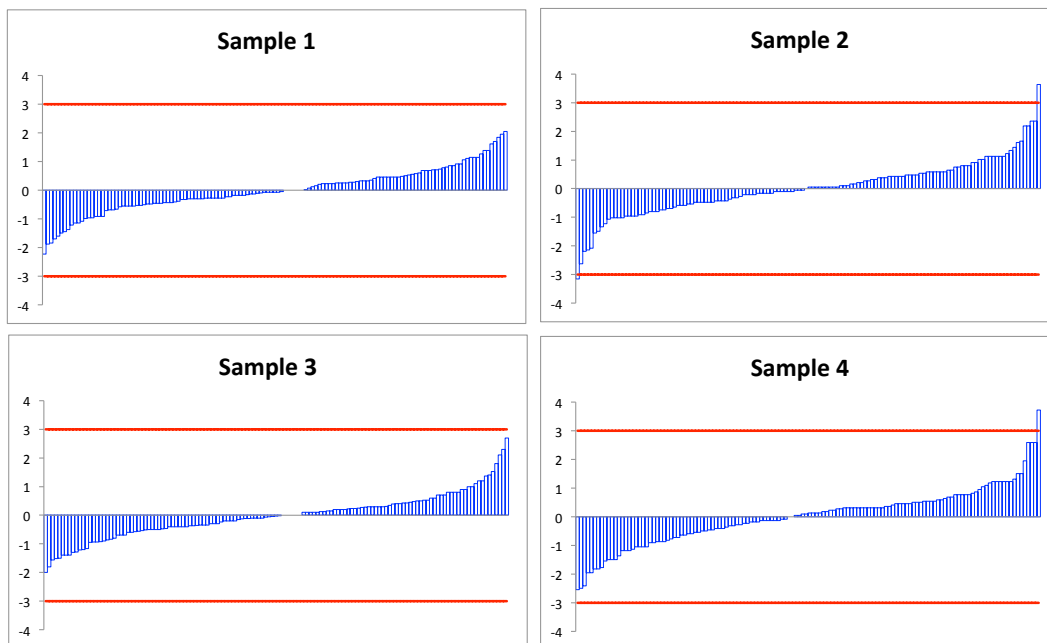


Potassium

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	5.8	5.79	5.8	5.64	5.95
Stdev	0.435	0.354	0.363	0.102	0.269
Number	135	68	47	10	6
z > 3	0	0	0	0	0
z 2 - 3	2	1	1	0	0

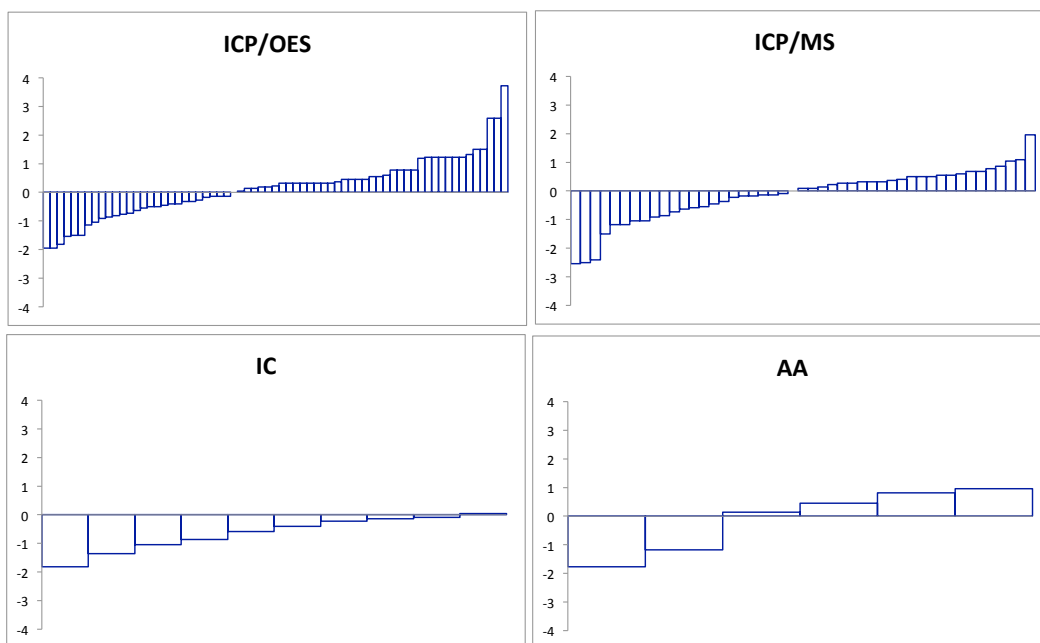
Sample 2					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	2.49	2.51	2.48	2.4	2.46
Stdev	0.187	0.188	0.171	0.0667	0.228
Number	134	67	47	10	6
z > 3	2	1	1	0	0
z 2 - 3	8	3	3	0	1

Sample 3					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	13.4	13.4	13.4	12.9	13.5
Stdev	1	0.833	0.782	0.384	0.611
Number	135	68	47	10	6
z > 3	0	0	0	0	0
z 2 - 3	3	2	1	0	0

Sample 4					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	2.93	2.98	2.95	2.82	3
Stdev	0.22	0.232	0.204	0.135	0.247
Number	134	67	47	10	6
z > 3	1	1	0	0	0
z 2 - 3	6	2	3	0	0

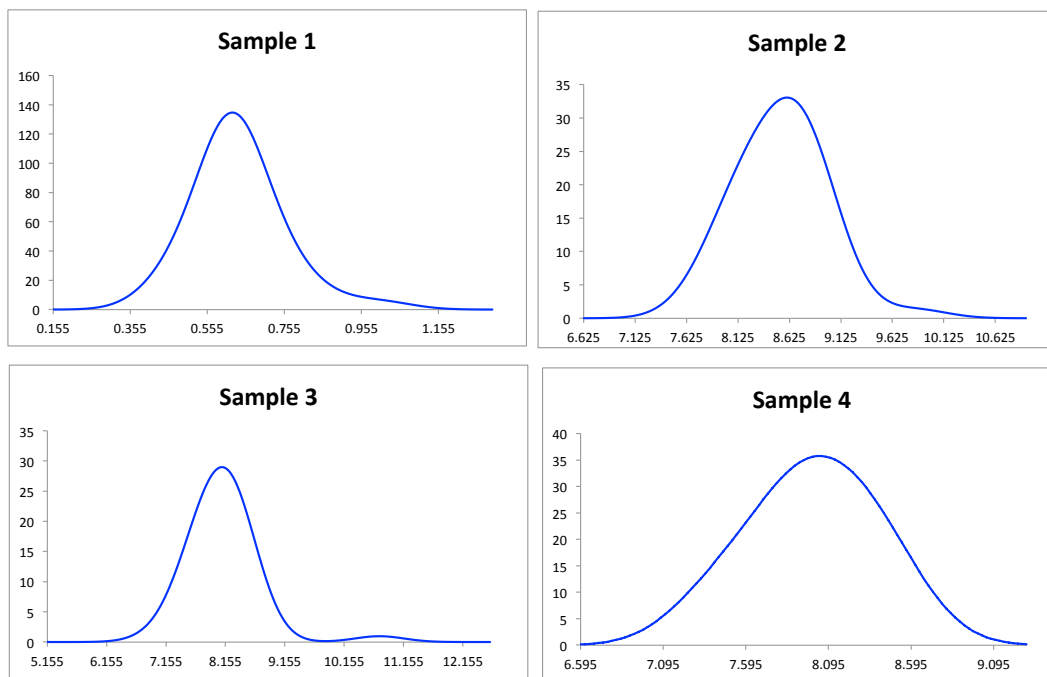
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

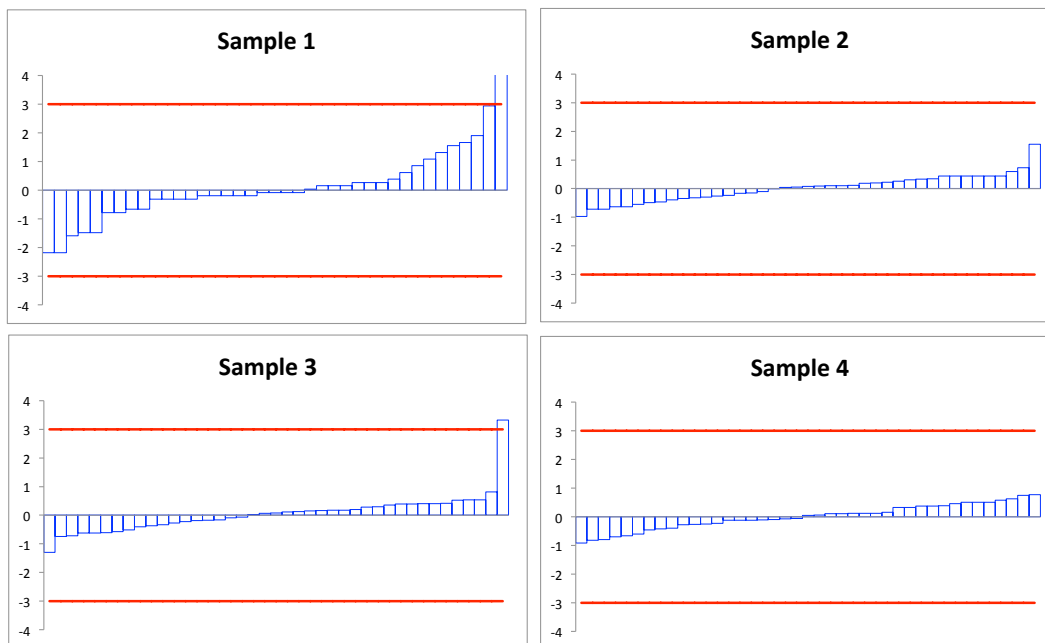


Reactive Silica

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	CLR-A	COLOR	CALC	
Median	0.627	0.61	0.65	0.63	0
Stdev	0.0859	0.0787	0.143	0.0403	0
Number	39	16	15	8	0
z >3	1	0	1	0	0
z 2 - 3	3	1	2	0	0

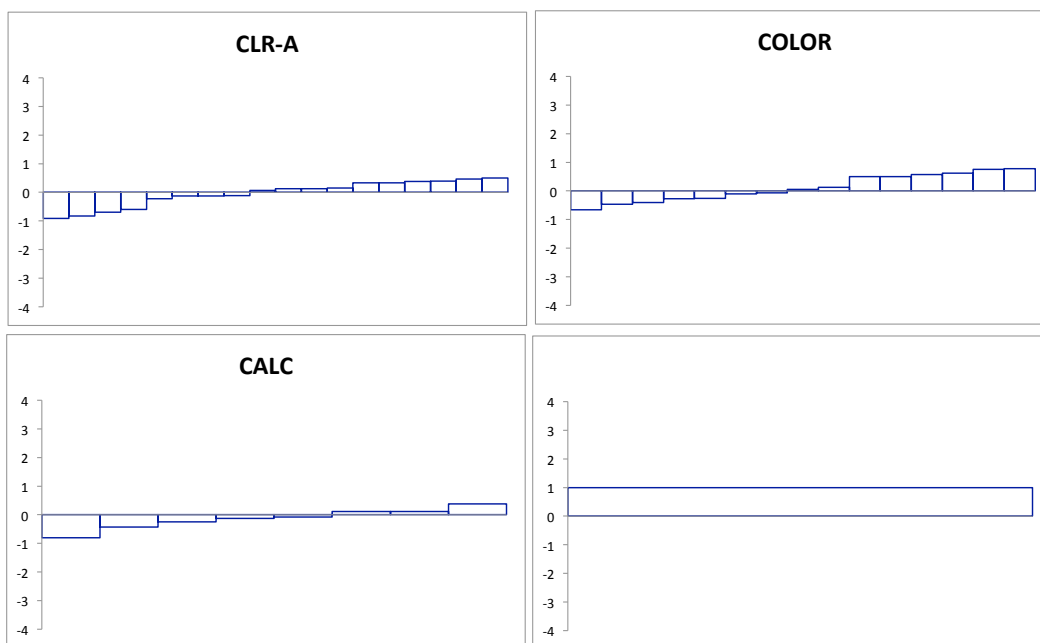
Sample 2					
Method	All*	CLR-A	COLOR	CALC	
Median	8.53	8.57	8.62	8.51	0
Stdev	0.853	0.379	0.489	0.293	0
Number	41	18	15	8	0
z >3	0	0	0	0	0
z 2 - 3	0	0	0	0	0

Sample 3					
Method	All*	CLR-A	COLOR	CALC	
Median	8.07	8.2	8.12	8.03	0
Stdev	0.807	0.296	0.84	0.299	0
Number	41	18	15	8	0
z >3	1	0	1	0	0
z 2 - 3	0	0	0	0	0

Sample 4					
Method	All*	CLR-A	COLOR	CALC	
Median	8	8.08	8.04	7.92	0
Stdev	0.8	0.36	0.382	0.291	0
Number	41	18	15	8	0
z >3	0	0	0	0	0
z 2 - 3	0	0	0	0	0

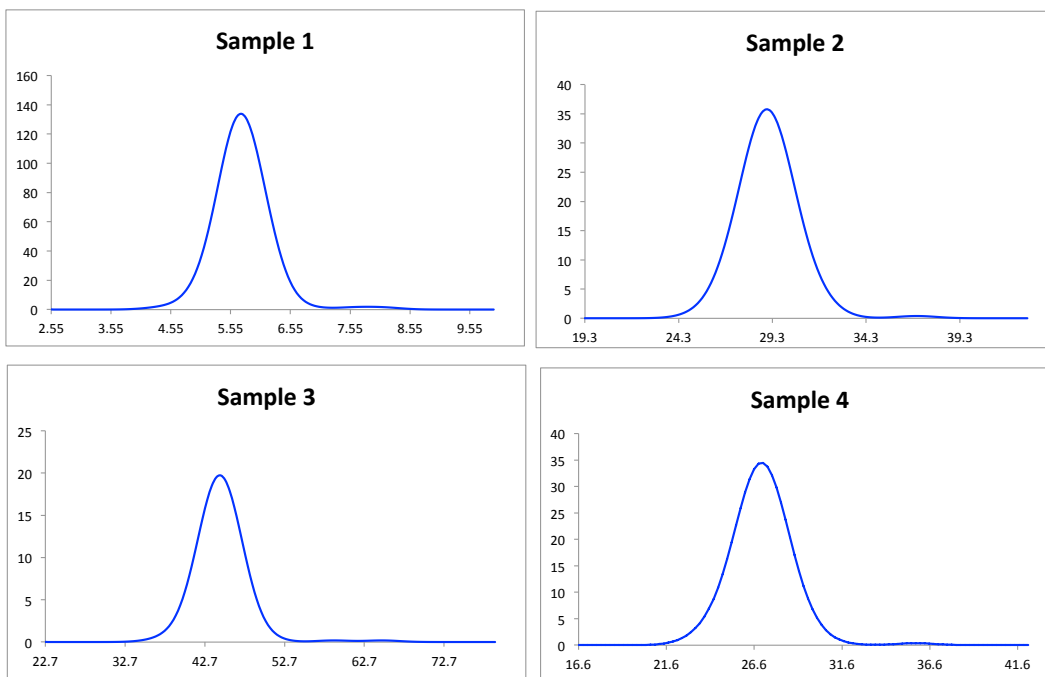
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

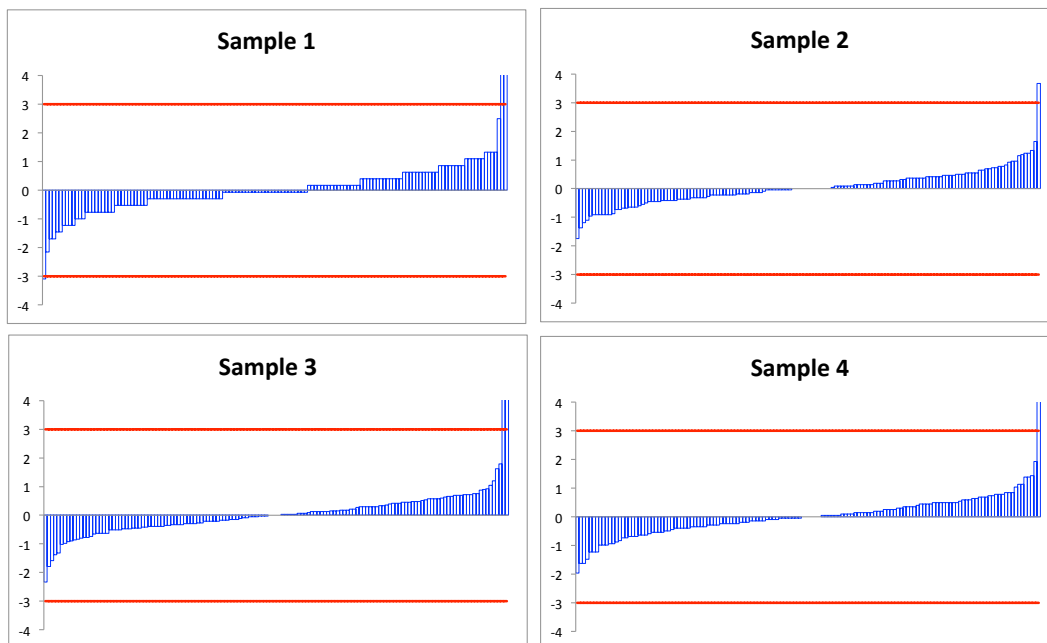


Sodium

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	5.73	5.7	5.7	5.6	5.8
Stdev	0.43	0.499	0.256	0.0905	0.313
Number	142	72	48	11	5
z >3	3	3	0	0	0
z 2 - 3	2	1	0	0	0

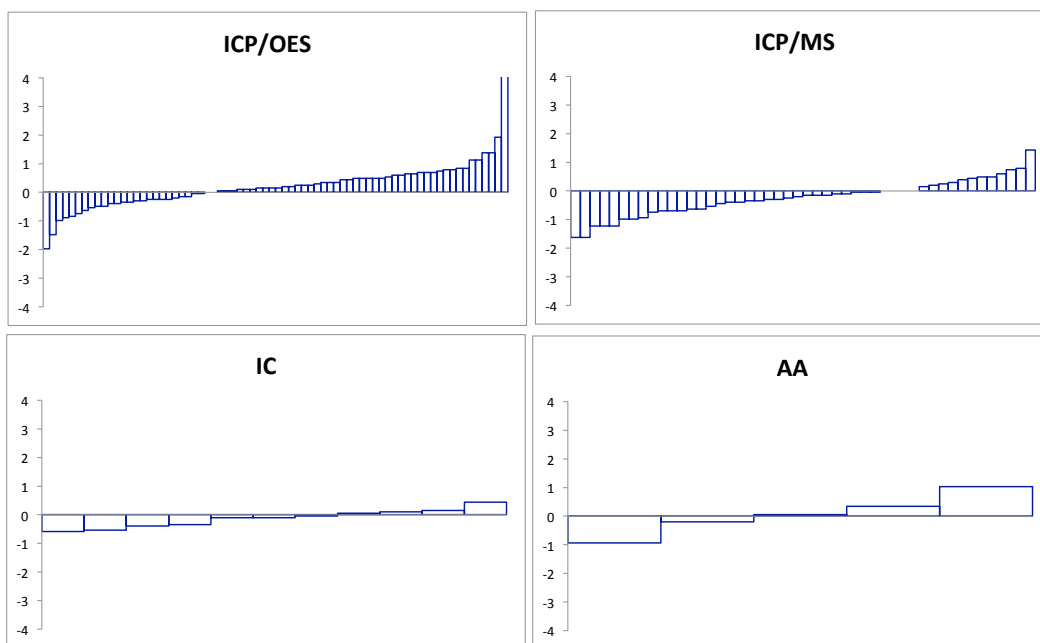
Sample 2					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	29	29.3	28.7	29	28.7
Stdev	2.18	1.52	1.34	0.817	1.22
Number	142	72	48	11	5
z >3	1	1	0	0	0
z 2 - 3	0	0	0	0	0

Sample 3					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	44.6	44.8	44.2	44.5	44.6
Stdev	3.34	3.43	2.34	1.22	1.97
Number	143	73	48	11	5
z >3	2	2	0	0	0
z 2 - 3	1	0	1	0	0

Sample 4					
Method	All*	ICP/OES	ICP/MS	IC	AA
Median	27	27.3	26.7	26.8	27.1
Stdev	2.03	1.64	1.27	0.641	1.47
Number	142	72	48	11	5
z >3	1	1	0	0	0
z 2 - 3	0	0	0	0	0

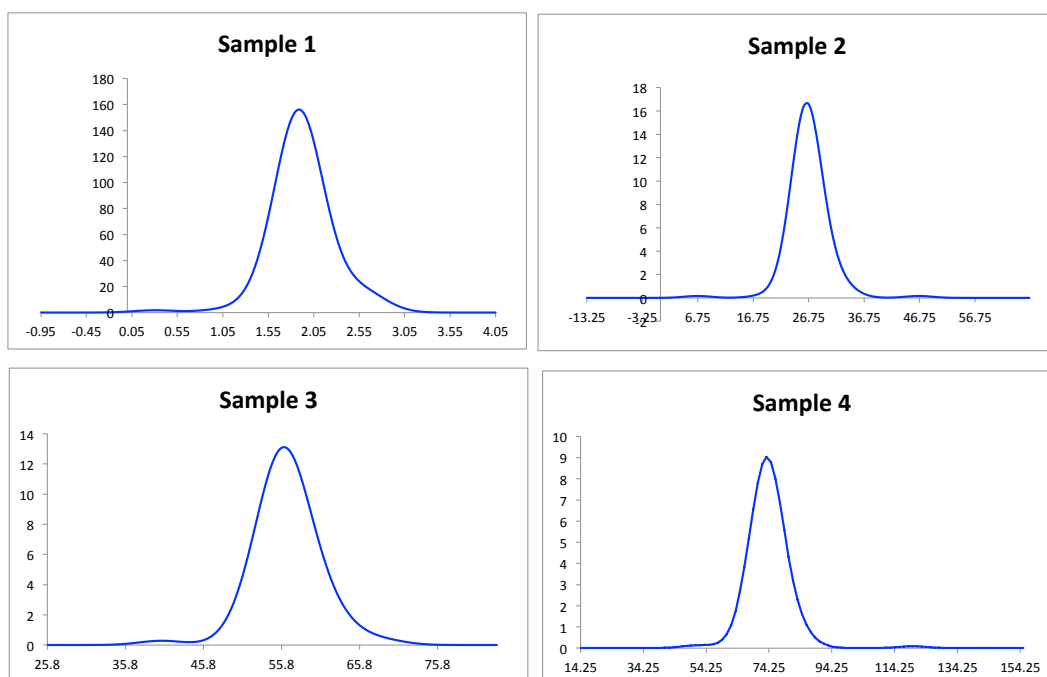
* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

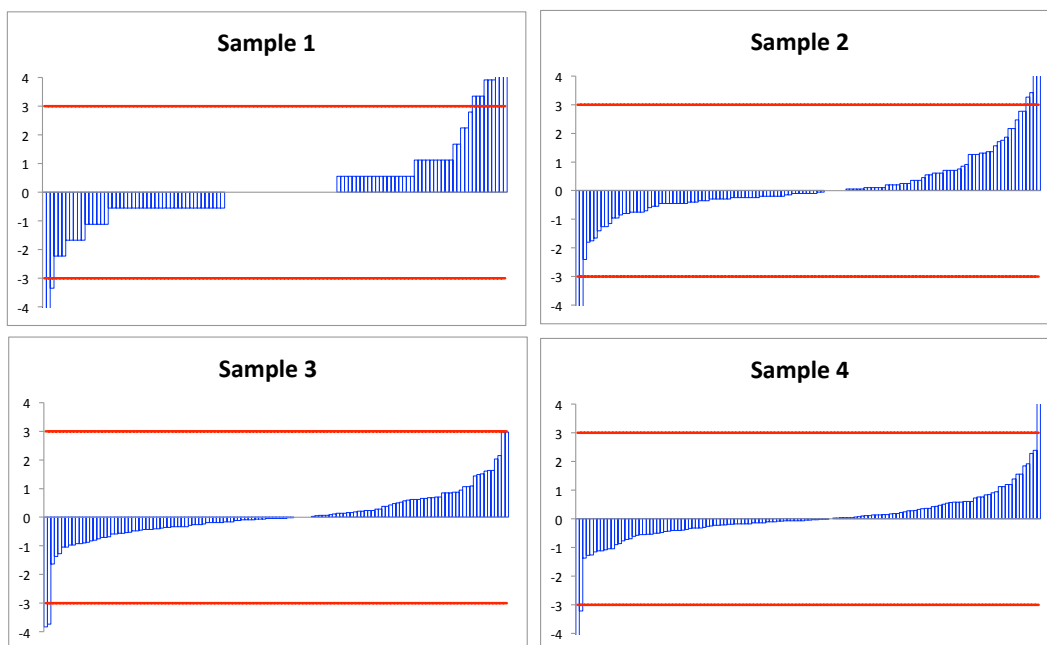


Sulfate

Kernel Density Plots



z-Score Plots



Summary Statistics by Four Most Common Methods

Sample 1					
Method	All*	IC	COLOR	CALC	TURB
Median	1.9	1.9	1.5	2.1	1.8
Stdev	0.179	0.211	0.822	0.121	0.714
Number	120	100	7	6	4
z >3	12	5	4	0	2
z 2 - 3	6	3	2	0	0

Sample 2					
Method	All*	IC	COLOR	CALC	TURB
Median	26.5	26.2	29.1	26.8	31.4
Stdev	1.99	3.17	3.95	1.44	2.63
Number	129	102	9	8	6
z >3	6	3	2	0	1
z 2 - 3	6	1	2	0	3

Sample 3					
Method	All*	IC	COLOR	CALC	TURB
Median	56.4	56	58.9	55.8	61
Stdev	4.23	3.33	5.47	2.08	3.73
Number	132	103	9	8	8
z >3	2	2	0	0	0
z 2 - 3	4	1	2	0	1

Sample 4					
Method	All*	IC	COLOR	CALC	TURB
Median	73.8	73.4	75.8	72.7	78
Stdev	5.54	4.52	15.9	2.18	3.9
Number	132	103	9	8	8
z >3	3	2	1	0	0
z 2 - 3	2	1	0	0	1

* Values for the median and standard deviation are the robust mean and acceptance limit deviation. For method statistics, the arithmetic mean and standard deviation are used.

z-Score Plots by Method - Sample 4

