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Geschäftsführer: Ralf Klaus Blecher // Amtsgericht Göttingen HRB 130263
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Analyse Service GmbH

Fluxana, Deutschland - Tonerde FLX-CRM 112

Veranstalter: FluXana GmbH & Co. KG, Borschelstr. 3, 47551 Bedburg-Hau
Ringversuchsmaterial: FLX-CRM 111 - Chrommagnesit, Germany
RV geschlossen: 2012 – 9
Literatur: Proficiency Test Report Fluxana FLX-CRM 111, 112 (CRB Laborcode = 23)

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
Al_2O_3	80,04	79,813	0,536	0,41
CaO	0,16	0,147	0,027	0,49
Fe_2O_3	0,39	0,326	0,074	0,87
K_2O	0,084	0,090	0,005	1,16
MgO	0,72	0,755	0,080	0,44
Na_2O	0,33	0,267	0,066	0,96
SiO_2	11,90	12,164	0,254	1,04
P2O5	0,082	0,074	0,012	0,71
TiO_2	0,20	0,273	0,025	2,94
LOI	5,01	5,424	0,126	3,32

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
Cr_2O_3	0,021	0,017	0,005	0,64
Mn_3O4	0,027	0,024	0,010	0,23
WO_3	0,013	0,037	0,024	1,02
Co_3O4	0,007	0,010	0,007	0,49
ZrO_2	5,86	5,949	0,333	0,28
NiO	0,010	0,009	0,004	1,10
HfO_2	0,122	0,0,97	0,029	0,84

Legende

CRB: Ergebnisse CRB – **RV:** Ergebnisse Ringversuch -- **1s-RV:** Standardabweichung Ringversuch
Z-Score: Differenz des Messwertes vom Mittelwert des Ringversuchs -- ***** Wert nicht zertifiziert

4FLUXANA® GmbH & Co. KG, Borschelstr. 3, D-47551 Bedburg-Hau

Lösungen aus einer Hand

ZERTIFIKAT

FLX CRM-111-112 Ringversuch 2012

CRB Analyse Service GmbH
Bahnhofstraße 14
37181 Hardegsen

Das Testlabor nahm mit der Labornummer23 an dem FLUXANA Ringversuch FLX CRM-111-112 mit Erfolg teil.

Probe: FLX CRM-111-112

Von 34 Parametern wurden 91% erfolgreich (d.h. nicht als Ausreißer detektiert) bestimmt:
Haupt- und Spurenelemente: Al_2O_3, CaO, Fe_2O_3, HfO_2, K_2O, MgO, NiO, SiO_2, SO_3 ,
TiO_2, ZrO_2, Co_3O_4, WO_3, Cr_2O_3, Mn_3O_4, P_2O_5, LOI

Die Durchführung dieses Ringversuchs und damit die Produktion dieses Referenzmaterials wurde in Übereinstimmung mit ISO Guide 34-2009, ISO Guide 31-2000 und ISO Guide 35-2006 ausgeführt.

Die Ergebnisse wurden in einem Bericht und Zertifikat zusammengefasst.

Bedburg-Hau , den 26.10.2012

Dr. Rainer Schramm

FLUXANA GmbH & Co.KG
Borschelstr. 3
47551 Bedburg-Hau

FLUXANA

New Certified Reference Materials

FLX-CRM 111, FLX-CRM 112

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Proficiency Test Report

FLX-CRM 111, FLX-CRM 112

Introduction

X-ray fluorescence analysis is a widely used technique for the analysis of oxidic materials. Different ISO methods like e.g. 12677:2011 or 29581-2:2010 describe the use in detail.

However for the calibration of xrf instruments dedicated standard material is needed. As a world wide supplier for xrf laboratories FLUXANA has developed a number of services to support xrf users. One of these services is the production of new reference materials in combination with a proficiency test.

From 2011 FLUXANA has introduced its own quality management in agreement with ISO 17025.

The production of reference materials and the corresponding proficiency tests including all evaluations are performed in agreement with ISO 17043, ISO Guide 34-2009, ISO Guide 31-2000 and ISO Guide 35-2006.

Proficiency test

All laboratories which applied until 29.02.2012 for the participation of the proficiency test got their samples starting week 10 and sent in their results until 31.05.2012.

Further information

In the following evaluation report all laboratory data are listed. Also the used methods like XRF according ISO 12677, XRF preparation as fused bead, XRF preparation as pressed pellet, XRF as reconstitution method, ICP-OES, combustion with HF-IR (high frequency infrared) or others are specified. Laboratories which are working under ISO 17025 accreditation are highlighted. Under Remark additional information is given.

Certificate of Analysis

Based on this report a certificate of analysis is issued separately.

Outlier evaluation

There will be two outlier tests based on **Grubbs** and **z-score**.
However every outlier detected by the test was verified individually. Sometimes a value detected as outlier is included to guarantee a balance between different analytical methods. These values are marked as **'included'**. Real outliers which were excluded from the calculation of mean, standard deviation and uncertainty are marked as **'confirmed outliers'**.

Statistical Evaluation for a new RM (reference material)

All mentioned calculations are based on:
Reference materials – General and statistical principles for certification ISO Guide 35:2006.
Conformity assessment - General requirements for proficiency testing ISO 17043:2010.

Calculation of laboratory average

Each participant of the proficiency test must perform a number of single measurements and report with significant digits.

For each participant a laboratory average $\bar{x}$ is calculated:

(1) $$\bar{x} = \sum_{k=1}^{p} \frac{x}{p}$$

1 x Single measurement
p Number of single measurements

Calculation of total average

From all laboratory averages a total average $\bar{\bar{x}}$ is calculated:

(2) $$\bar{\bar{\mathrm{x}}} = \sum_{\mathrm{k=1}}^{\mathrm{n}} \frac{\bar{\mathrm{x}}}{\mathrm{n}}$$

n Number of participants

Calculation of standard deviation

From all laboratory averages the standard deviation **s** is calulated:

(3) $$\mathrm{s} = \sqrt{\sum_{\mathrm{k=1}}^{\mathrm{n}} (\bar{\bar{\mathrm{x}}} - \bar{\mathrm{x}})^2 / (\mathrm{n} - 1)}$$

Test for outliers

From all laboratory averages the **z-score** z is calculated:

$$z = \left|(\bar{\bar{x}} - \bar{x}) \quad / s\right| \tag{4}$$

An outlier test based on z-score is performed:

z <= 2,0	indicates ‚satisfactory' performance = generates no signal
2,0 < z < 3,0	indicates ‚questionable' performance = generates a warning signal
z >= 3,0	indicates ‚unsatisfactory' performance = generates an action signal

Parallel an outlier test based on Grubbs is performed:

$$PG = \left|(\bar{\bar{x}} - \bar{x}) \quad / s\right| \tag{5}$$

PG test value

Based on table 1 a comparison value for the half width confidence interval is calculated for n:

PG <= VG	indicates ‚satisfactory' performance = generates no signal
PG > VG	indicates ‚unsatisfactory' performance = generates an action signal

In case an outlier is detected the data will be taken out and all calculations according formulars 2,3,4,5 have to be repeated. A new test for outliers must be performed.

Calculation of the uncertainty

The uncertainty values are coming from the half width confidence interval C(95%). It is equal to:

$$C(95\%) = t * s/\sqrt{n} \tag{6}$$

t Student's value

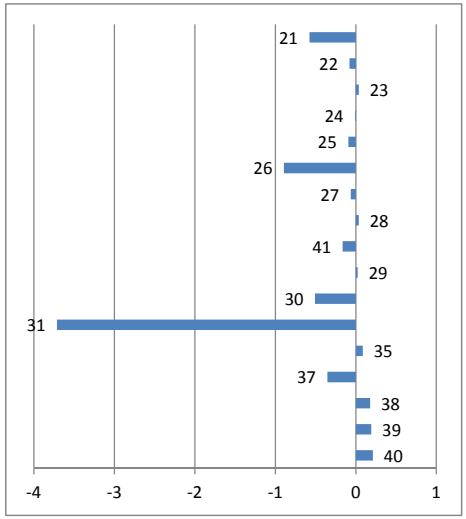
where t is the appropriate Student's value, n the number of acceptable mean values and s the standard deviation.

Participating Laboratories

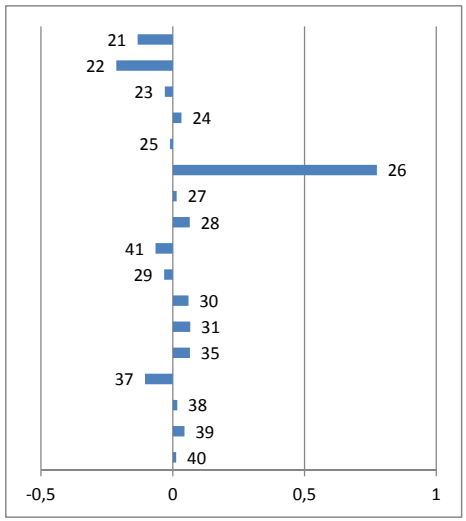
Bachema AG	Schlieren	Switzerland
BASF Coatings GmbH	Münster	Germany
CRB Analyse Service GmbH	Hardegsen	Germany
Deutsches Institut für Feuerfest und Keramik GmbH	Bonn	Germany
Dorfner Anzaplan	Hirschau	Germany
FLUXANA GmbH & Co.KG	Bedburg-Hau	Germany
Fundacion ITMA	Llanera-Asturias	Spain
Grothe Rohstoffe GmbH & Co. KG	Bückeburg	Germany
Holcim (Deutschland) AG	Sehnde	Germany
Hoppecke Batterien GmbH & Co. KG	Brilon-Hoppecke	Germany
HuK Umweltlabor GmbH	Wenden-Hünsborn	Germany
Imerys Minerals Ltd.	Cornwall	England
Instituto Nacional del Carbón (INCAR-CSIC)	Oviedo (Asturias)	Spain
Rockwool BV	JG Roermond	Netherlands
ThyssenKrupp Steel Europe AG	Duisburg	Germany
Vargön Alloys AB	Vargön	Sweden

FLX-CRM 111

Al2O3	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:28:20	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	ISO 12677			3,942	4,232	x4,087		3,68	Outlier	x
22	ISO 12677		reconstitution	4,726	4,443	4,585		0,50		
23	ISO 12677	YES		4,770	4,630	4,700		0,23		
24	ISO 12677			4,640	4,668	4,654		0,06		
25	XRF bead			4,700	4,440	4,570		0,60		
26	XRF pellet			3,832	3,706	x3,769		5,71	Outlier	x
27	ISO 12677	YES		4,680	4,520	4,600		0,41		
28	ISO 12677	YES		4,670	4,730	4,700		0,23		
41	ICP-OES	YES	ISO 11885-E22	4,500		4,500		1,04		
29	ISO 12677	YES		4,650	4,722	4,686		0,14		
30	XRF bead			4,130	4,180	x4,155		3,24	Outlier	x
31	ISO 12677	YES		0,837	1,061	x0,949		23,70	Outlier	x
35	ISO 12677			4,784	4,714	4,749		0,55		
37	ICP-OES		Borax fusion	4,310		4,310		2,26	Included	
38	ISO 12677	YES		4,814	4,870	4,842		1,14		
39	XRF bead			4,780	4,930	4,855		1,22		
40	ISO 12677			4,936	4,815	4,876		1,35		
					n	13				
					Mean	4,664				
					Max	4,876				
					Min	4,310				
					Stdev s	0,157				
					C(95%)	0,095	C(95%)=t*s/SQR(n) t(13)=2,179			

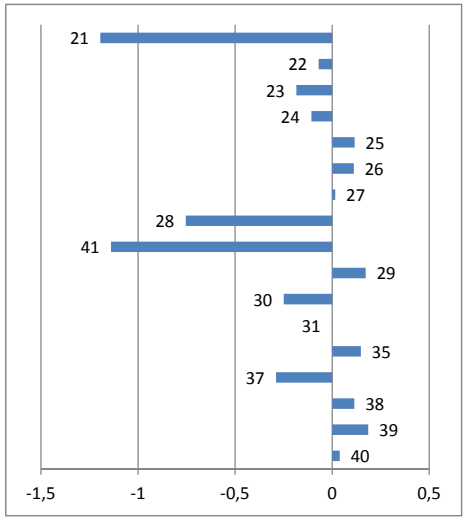


CaO	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:27:51	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=15 VG=2,409	confirmed
21	ISO 12677			1,975	1,888	1,932		2,12		
22	ISO 12677		reconstitution	1,871	1,830	x1,851		3,41	Outlier	x
23	ISO 12677	YES		2,040	2,030	2,035		0,48		
24	ISO 12677			2,089	2,108	2,099		0,53		
25	XRF bead			2,050	2,060	2,055		0,16		
26	XRF pellet			2,851	2,828	x2,840		12,32	Outlier	x
27	ISO 12677	YES		2,070	2,090	2,080		0,23		
28	ISO 12677	YES		2,120	2,140	2,130		1,03		
41	ICP-OES	YES	ISO 11885-E22	2,000		2,000		1,04		
29	ISO 12677	YES		2,015	2,050	2,033		0,52		
30	XRF bead			2,140	2,110	2,125		0,95		
31	ISO 12677	YES		2,141	2,122	2,132		1,05		
35	ISO 12677			2,138	2,123	2,131		1,04		
37	ICP-OES		aqua regia	1,960		1,960		1,68		
38	ISO 12677	YES		2,094	2,071	2,083		0,27		
39	XRF bead			2,080	2,140	2,110		0,71		
40	ISO 12677			2,069	2,087	2,078		0,20		
					n	15				
					Mean	2,065				
					Max	2,132				
					Min	1,932				
					Stdev s	0,063				
					C(95%)	0,035	C(95%)=t*s/SQR(n) t(15)=2,145			

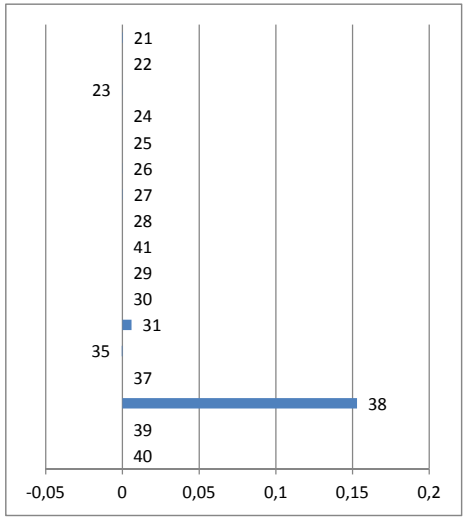


FLX-CRM 111

Fe2O3	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:28:29	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			8,367	8,323	x8,345		7,58	Outlier	x
22	ISO 12677		reconstitution	9,482	9,457	9,470		0,44		
23	ISO 12677	YES		9,310	9,400	9,355		1,17		
24	ISO 12677			9,407	9,457	9,432		0,68		
25	XRF bead			9,620	9,690	9,655		0,73		
26	XRF pellet			9,483	9,818	9,651		0,71		
27	ISO 12677	YES		9,500	9,610	9,555		0,10		
28	ISO 12677	YES		8,770	8,800	x8,785		4,79	Outlier	x
41	ICP-OES	YES	ISO 11885-E22	8,400		x8,400		7,23	Outlier	x
29	ISO 12677	YES		9,768	9,656	9,712		1,10		
30	XRF bead			9,280	9,300	9,290		1,58		
31	ISO 12677	YES		9,555	9,522	9,539		0,01		
35	ISO 12677			9,715	9,659	9,687		0,94		
37	ICP-OES		Borax fusion	9,250		9,250		1,84		
38	ISO 12677	YES		9,699	9,607	9,653		0,72		
39	XRF bead			9,810	9,640	9,725		1,18		
40	ISO 12677			9,522	9,634	9,578		0,25		
					n	14				
					Mean	9,539				
					Max	9,725				
					Min	9,250				
					Stdev s	0,158				
					C(95%)	0,091	C(95%)=t*s/SQR(n) t(14)=2,160			

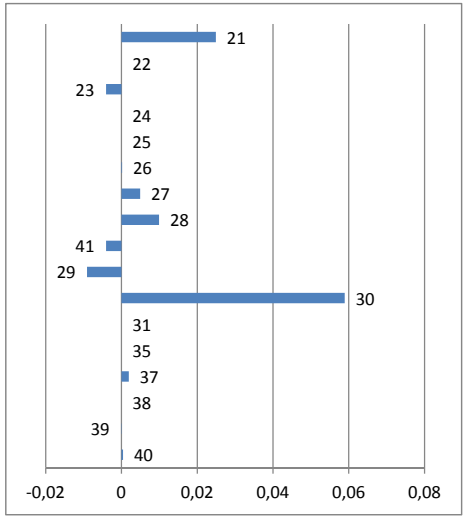


HfO2	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:10:27	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=5 VG=1,672	confirmed
21	XRF pellet			0,001	0,001	0,001		0,96		
22										
23	ISO 12677	YES		0,001	0,001	0,001		0,15		
24	ISO 12677			<0,02	<0,02					
25										
26	XRF pellet			0,001	0,001	0,001		0,29		
27	ICP-OES	YES		0,001	0,002	0,001		0,54		
28	ISO 12677	YES		<0,01	<0,01					
41	ICP-OES	YES	ISO 11885-E22	<0,005						
29										
30										
31	ISO 12677	YES		0,007	0,007	x0,007		22,10	Outlier	x
35	ISO 12677			0,001	0,001	0,001		1,64		
37										
38	ISO 12677	YES		0,154	0,154	x0,154		567,29	Outlier	x
39										
40	ISO 12677									
					n	5				
					Mean	0,001				
					Max	0,001				
					Min	0,001				
					Stdev s	0,000				
					C(95%)	0,000	C(95%)=t*s/SQR(n) t(5)=2,776			

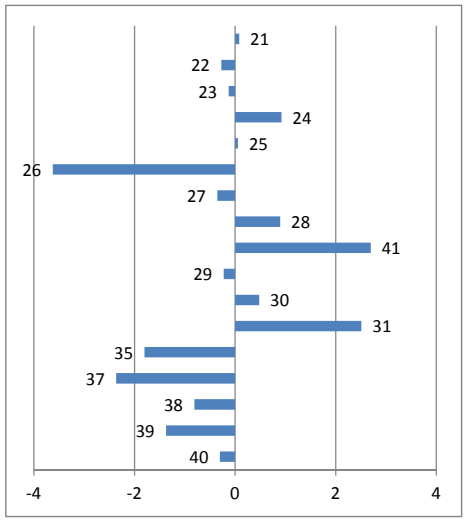


FLX-CRM 111

K2O	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:28:38	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=9 VG=2,110	confirmed
21	ISO 12677			0,026	0,044	x0,035		4,53	Outlier	x
22										
23	ISO 12677	YES		0,005	0,007	0,006		0,74		
24	ISO 12677			<0,03	<0,03					
25	XRF bead			<0,1	<0,1					
26	XRF pellet			0,013	0,007	0,010		0,03		
27	ICP-OES	YES		0,020	0,010	0,015		0,89		
28	ISO 12677	YES		0,020	0,020	0,020		1,80		
41	ICP-OES	YES	ISO 11885-E22	0,006		0,006		0,74		
29	ISO 12677	YES		0,001	0,001	0,001		1,65		
30	XRF bead			0,066	0,071	x0,069		10,71	Outlier	x
31	ISO 12677	YES		<0,0012	<0,0012					
35	ISO 12677			<0,0100	<0,0100					
37	ICP-OES		aqua regia	0,012		0,012		0,35		
38	ISO 12677	YES		<0,01	<0,01					
39	XRF bead			0,010	0,010	0,010		0,01		
40	ISO 12677			0,011	0,010	0,011		0,08		
					n	9				
					Mean	0,010				
					Max	0,020				
					Min	0,001				
					Stdev s	0,006				
					C(95%)	0,004	C(95%)=t*s/SQR(n) t(9)=2,306			

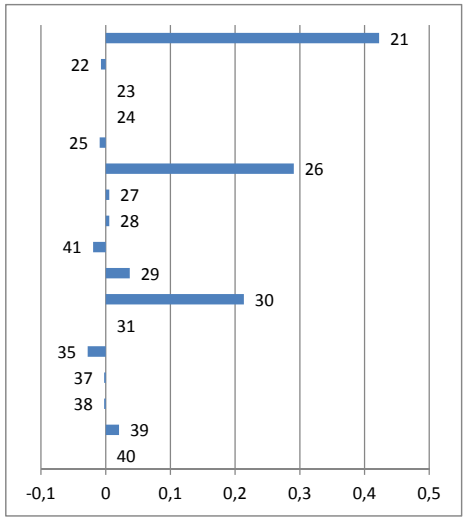


MgO	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:28:49	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=16 VG=2,443	confirmed
21	ISO 12677			70,605	69,964	70,285		0,06		
22	ISO 12677		reconstitution	69,913	69,945	69,929		0,20		
23	ISO 12677	YES		70,080	70,070	70,075		0,10		
24	ISO 12677			70,970	71,284	71,127		0,69		
25	XRF bead			70,590	69,930	70,260		0,04		
26	XRF pellet			66,790	66,370	x66,580		2,69	Outlier	x
27	ISO 12677	YES		69,900	69,800	69,850		0,26		
28	ISO 12677	YES		71,300	70,900	71,100		0,67		
41	ICP-OES	YES	ISO 11885-E22	72,900		72,900		2,00		
29	ISO 12677	YES		69,669	70,284	69,977		0,17		
30	XRF bead			70,940	70,426	70,683		0,36		
31	ISO 12677	YES		72,780	72,650	72,715		1,86		
35	ISO 12677			68,605	68,200	68,403		1,34		
37	ICP-OES		aqua regia	67,840		67,840		1,76		
38	ISO 12677	YES		69,455	69,333	69,394		0,60		
39	XRF bead			69,010	68,650	68,830		1,02		
40	ISO 12677			69,883	69,917	69,900		0,23		
					n	16				
					Mean	70,204				
					Max	72,900				
					Min	67,840				
					Stdev s	1,347				
					C(95%)	0,717	C(95%)=t*s/SQR(n) t(16)=2,131			

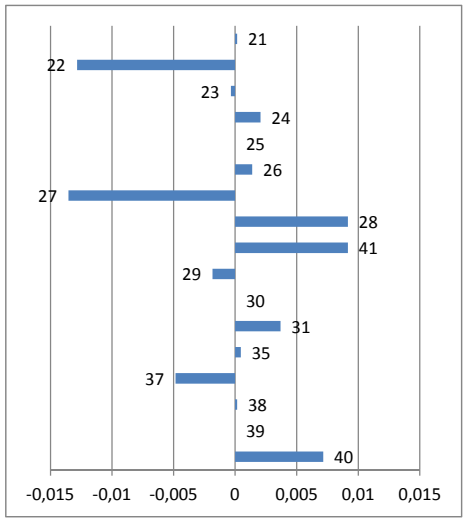


FLX-CRM 111

Na2O	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:28:58	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	ISO 12677			0,500	0,483	x0,492		22,51	Outlier	x
22	ISO 12677		reconstitution	0,049	0,075	0,062		0,39		
23	ISO 12677	YES		<0,03	<0,03					
24										
25	ICP-OES			0,060	0,060	0,060		0,50		
26	XRF pellet			0,351	0,368	x0,360		15,48	Outlier	x
27	ICP-OES	YES		0,070	0,080	0,075		0,30		
28	ISO 12677	YES		0,080	0,070	0,075		0,30		
41	ICP-OES	YES	ISO 11885-E22	0,050		0,050		1,03		
29	ISO 12677	YES		0,104	0,109	0,107		1,98		
30	XRF bead			0,277	0,289	x0,283		11,38	Outlier	x
31	ISO 12677	YES		<0,014	<0,014					
35	ISO 12677			0,038	0,045	0,042		1,49		
37	ICP-OES		aqua regia	0,067		0,067		0,13		
38	ISO 12677	YES		0,072	0,062	0,067		0,13		
39	XRF bead			0,080	0,100	0,090		1,10		
40	ISO 12677			<0,1	<0,1					
					n	10				
					Mean	0,069				
					Max	0,107				
					Min	0,042				
					Stdev s	0,019				
					C(95%)	0,013	C(95%)=t*s/SQR(n) t(10)=2,262			

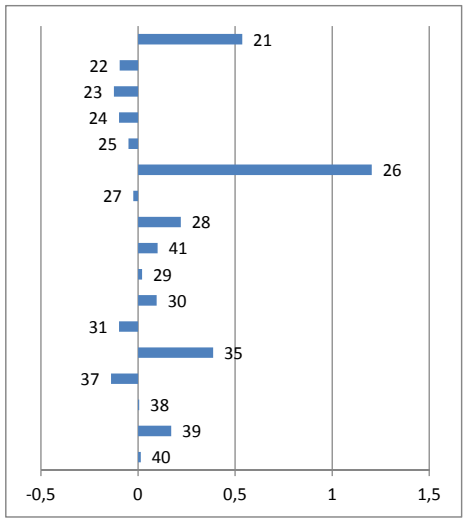


NiO	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:11:18	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	XRF pellet			0,031	0,031	0,031		0,02		
22	ISO 12677		reconstitution	0,018	0,018	0,018		1,87		
23	ISO 12677	YES		0,030	0,031	0,031		0,05		
24	ISO 12677			0,033	0,033	0,033		0,30		
25										
26	XRF pellet			0,033	0,031	0,032		0,20		
27	ICP-OES	YES		0,017	0,017	0,017		1,97		
28	ISO 12677	YES		0,040	0,040	0,040		1,33		
41	ICP-OES	YES	ISO 11885-E22	0,040		0,040		1,33		
29	ISO 12677	YES		0,029	0,029	0,029		0,27		
30										
31	ISO 12677	YES		0,035	0,034	0,035		0,54		
35	ISO 12677			0,031	0,032	0,031		0,07		
37	ICP-OES		aqua regia	0,026		0,026		0,70		
38	ISO 12677	YES		0,031	0,031	0,031		0,02		
39										
40	ISO 12677			0,038	0,038	0,038		1,04		
					n	14				
					Mean	0,031				
					Max	0,040				
					Min	0,017				
					Stdev s	0,007				
					C(95%)	0,004	C(95%)=t*s/SQR(n) t(14)=2,160			

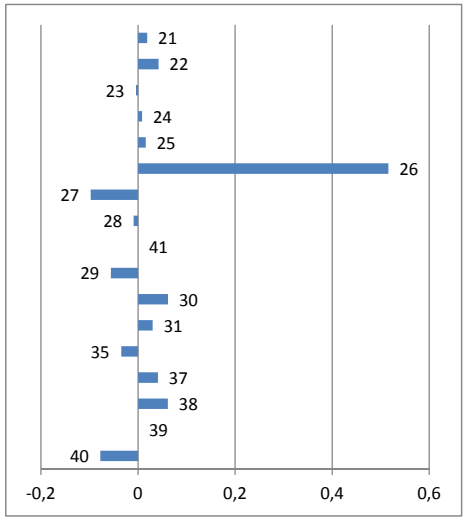


FLX-CRM 111

SiO2	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:06	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			1,694	2,177	x1,936		4,78	Outlier	x
22	ISO 12677		reconstitution	1,311	1,299	1,305		0,84		
23	ISO 12677	YES		1,290	1,260	1,275		1,11		
24	ISO 12677			1,302	1,301	1,302		0,87		
25	XRF bead			1,310	1,390	1,350		0,44		
26	XRF pellet			2,654	2,552	x2,603		10,72	Outlier	x
27	ISO 12677	YES		1,350	1,400	1,375		0,22		
28	ISO 12677	YES		1,610	1,630	1,620		1,97		
41	ICP-OES	YES	ISO 11885-E22	1,500		1,500		0,90		
29	ISO 12677	YES		1,436	1,405	1,421		0,19		
30	XRF bead			1,490	1,500	1,495		0,85		
31	ISO 12677	YES		1,312	1,291	1,302		0,87		
35	ISO 12677			1,814	1,758	x1,786		3,44	Outlier	x
37	ICP-OES		Borax fusion	1,260		1,260		1,24		
38	ISO 12677	YES		1,406	1,405	1,406		0,05		
39	XRF bead			1,510	1,630	1,570		1,52		
40	ISO 12677			1,412	1,415	1,414		0,13		
					n	14				
					Mean	1,399				
					Max	1,620				
					Min	1,260				
					Stdev s	0,112				
					C(95%)	0,065	C(95%)=t*s/SQR(n) t(14)=2,160			

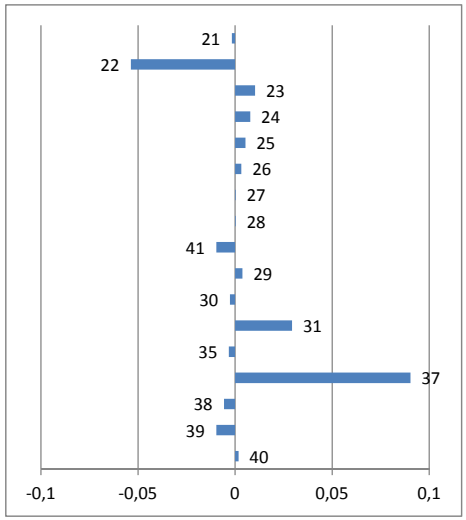


Total S expressed as SO3	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:12	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	HF-IR			0,153	0,153	0,153		0,38		
22	ISO 12677		reconstitution	0,173	0,180	0,177		0,85		
23	ISO 12677	YES		0,120	0,140	0,130		0,08		
24	HF-IR			0,145	0,140	0,143		0,17		
25	HF-IR			0,150	0,150	0,150		0,32		
26	XRF pellet			0,474	0,826	x0,650		10,29	Outlier	x
27	HF-IR	YES		0,040	0,033	0,037		1,95		
28	ISO 12677	YES		0,120	0,130	0,125		0,18		
41										
29	ISO 12677	YES		0,064	0,092	0,078		1,12		
30	XRF bead			0,189	0,203	0,196		1,23		
31	ISO 12677	YES		0,161	0,167	0,164		0,60		
35	ISO 12677			0,101	0,098	0,099		0,69		
37	ICP-OES		aqua regia	0,175		0,175		0,82		
38	HF-IR		DIN 51095-1	0,195	0,196	0,196		1,22		
39										
40	ISO 12677			0,073	0,040	0,057		1,55		
					n	14				
					Mean	0,134				
					Max	0,196				
					Min	0,037				
					Stdev s	0,050				
					C(95%)	0,029	C(95%)=t*s/SQR(n) t(14)=2,160			

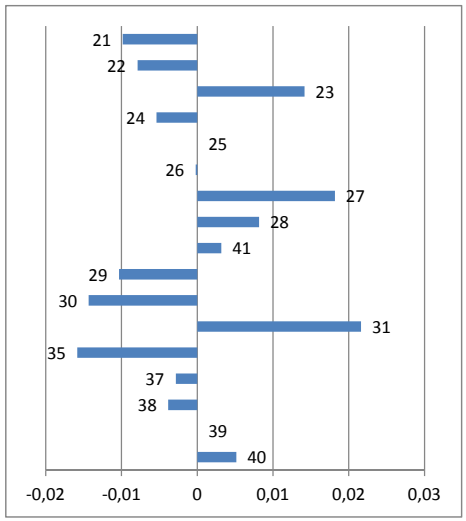


FLX-CRM 111

TiO2	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:21	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			0,158	0,158	0,158		0,29		
22	ISO 12677		reconstitution	0,103	0,109	x0,106		8,99	Outlier	x
23	ISO 12677	YES		0,167	0,173	0,170		1,72		
24	ISO 12677			0,170	0,165	0,168		1,30		
25	XRF bead			0,170	0,160	0,165		0,89		
26	XRF pellet			0,161	0,165	0,163		0,53		
27	ISO 12677	YES		0,160	0,160	0,160		0,05		
28	ISO 12677	YES		0,160	0,160	0,160		0,05		
41	ICP-OES	YES	ISO 11885-E22	0,150		0,150		1,62		
29	ISO 12677	YES		0,165	0,162	0,164		0,63		
30	XRF bead			0,158	0,156	0,157		0,45		
31	ISO 12677	YES		0,188	0,190	x0,189		4,90	Outlier	x
35	ISO 12677			0,149	0,164	0,157		0,54		
37	ICP-OES		Borax fusion	0,250		x0,250		15,11	Outlier	x
38	ISO 12677	YES		0,154	0,154	0,154		0,96		
39	XRF bead			0,150	0,150	0,150		1,62		
40	ISO 12677			0,164	0,159	0,162		0,30		
					n	14				
					Mean	0,160				
					Max	0,170				
					Min	0,150				
					Stdev s	0,006				
					C(95%)	0,003	C(95%)=t*s/SQR(n) t(14)=2,160			

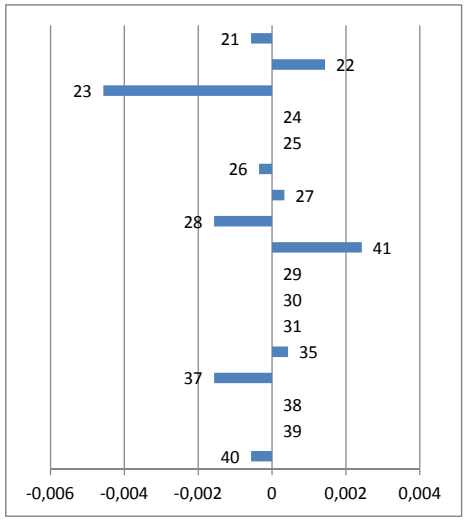


ZrO2	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:26	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=15 VG=2,409	confirmed
21	XRF pellet			0,047	0,047	0,047		0,85		
22	ISO 12677		reconstitution	0,054	0,044	0,049		0,68		
23	ISO 12677	YES		0,073	0,069	0,071		1,22		
24	ISO 12677			0,051	0,052	0,051		0,47		
25										
26	XRF pellet			0,058	0,055	0,057		0,02		
27	ISO 12677	YES		0,070	0,080	0,075		1,57		
28	ISO 12677	YES		0,060	0,070	0,065		0,71		
41	ICP-OES	YES	ISO 11885-E22	0,060		0,060		0,27		
29	ISO 12677	YES		0,043	0,050	0,047		0,89		
30	XRF bead			0,041	0,044	0,043		1,24		
31	ISO 12677	YES		0,078	0,079	0,078		1,87		
35	ISO 12677			0,042	0,040	0,041		1,37		
37	ICP-OES		Borax fusion	0,054		0,054		0,24		
38	ISO 12677	YES		0,051	0,055	0,053		0,33		
39										
40	ISO 12677			0,067	0,057	0,062		0,45		
					n	15				
					Mean	0,057				
					Max	0,078				
					Min	0,041				
					Stdev s	0,012				
					C(95%)	0,006	C(95%)=t*s/SQR(n) t(15)=2,145			

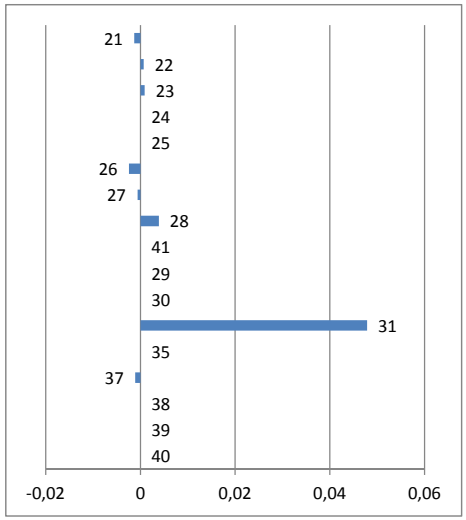


FLX-CRM 111

Co3O4	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:12:23	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=9 VG=2,110	confirmed
21	XRF pellet			0,011	0,011	0,011		0,43		
22	ISO 12677			0,013	0,013	0,013		1,08		
23	ISO 12677	YES		0,006	0,007	x0,007		3,46	Outlier	x
24	ISO 12677			<0,02	<0,02					
25										
26	XRF pellet			0,011	0,011	0,011		0,27		
27	ICP	YES		0,011	0,013	0,012		0,25		
28	ISO 12677	YES		0,010	0,010	0,010		1,19		
41	ICP-OES	YES	ISO 11885-E22	0,014		0,014		1,84		
29										
30										
31	ISO 12677	YES								
35	ISO 12677			0,013	0,011	0,012		0,33		
37	ICP-OES		aqua regia	0,010		0,010		1,19		
38	ISO 12677	YES		<0,01	<0,01					
39										
40	ISO 12677			0,010	0,012	0,011		0,43		
					n	9				
					Mean	0,012				
					Max	0,014				
					Min	0,010				
					Stdev s	0,001				
					C(95%)	0,001	C(95%)=t*s/SQR(n) t(9)=2,306			

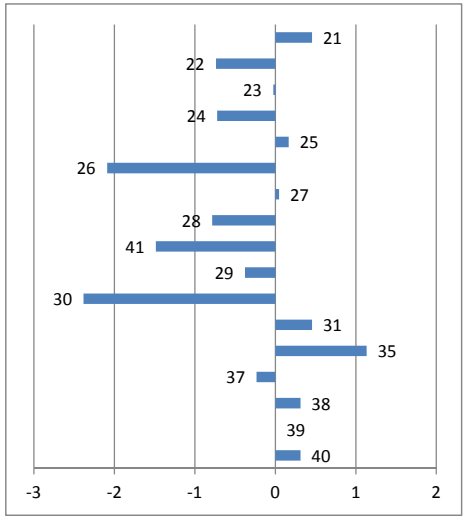


WO3	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:47	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=7 VG=1,938	confirmed
21	XRF pellet			0,005	0,005	0,005		0,64		
22	ISO 12677		reconstitution	0,007	0,007	0,007		0,33		
23	ISO 12677	YES		0,007	0,007	0,007		0,43		
24										
25										
26	XRF pellet			0,005	0,002	0,004		1,17		
27	ICP	YES		0,005	0,006	0,006		0,30		
28	ISO 12677	YES		0,010	0,010	0,010		1,88		
41										
29										
30										
31	ISO 12677	YES		0,054	0,055	x0,054		23,20	Outlier	x
35	ISO 12677			<0,004	<0,004					
37	ICP-OES		aqua regia	0,005		0,005		0,54		
38	ISO 12677	YES		<0,01	<0,01					
39										
40	ISO 12677			<0,02	<0,02					
					n	7				
					Mean	0,006				
					Max	0,010				
					Min	0,004				
					Stdev s	0,002				
					C(95%)	0,002	C(95%)=t*s/SQR(n) t(7)=2,447			

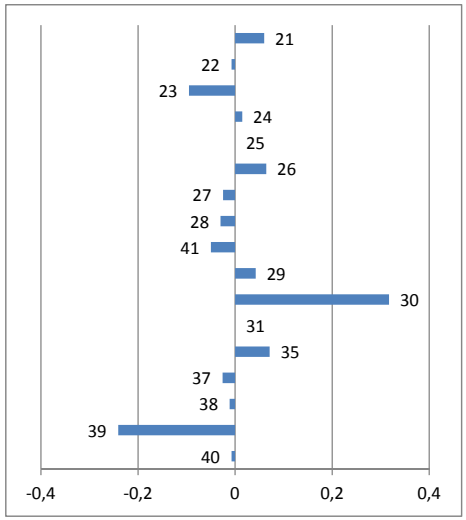


FLX-CRM 111

Cr2O3	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:29:57	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	XRF pellet			11,940	11,940	11,940		0,81		
22	ISO 12677		reconstitution	10,658	10,838	10,748		1,31		
23	ISO 12677	YES		11,420	11,500	11,460		0,04		
24	ISO 6331			10,777	10,747	10,762		1,28		
25	XRF bead			11,690	11,610	11,650		0,29		
26	XRF pellet			9,305	9,482	x9,394		3,71	Outlier	x
27	ISO 12677	YES		11,560	11,500	11,530		0,08		
28	ISO 12677	YES		10,600	10,800	10,700		1,39		
41	ICP-OES	YES	ISO 11885-E22	10,000		x10,000		2,64	Outlier	x
29	ISO 12677	YES		11,382	10,832	11,107		0,67		
30	XRF bead			8,975	9,224	x9,100		4,24	Outlier	x
31	ISO 12677	YES		11,950	11,930	11,940		0,81		
35	ISO 12677			12,570	12,666	12,618		2,01		
37	ICP-OES		Borax fusion	11,250		11,250		0,42		
38	ISO 12677	YES		11,701	11,894	11,798		0,56		
39										
40	ISO 12677			11,800	11,794	11,797		0,55		
					n	13				
					Mean	11,485				
					Max	12,618				
					Min	10,700				
					Stdev s	0,563				
					C(95%)	0,340	C(95%)=t*s/SQR(n) t(13)=2,179			

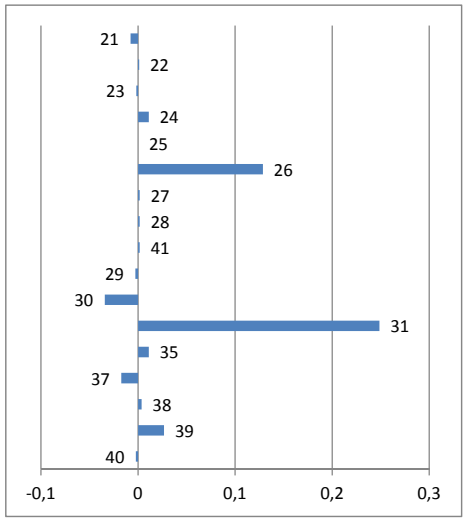


Mn3O4	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:30:02	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	XRF pellet			0,430	0,430	0,430		1,23		
22	ISO 12677		reconstitution	0,361	0,364	0,363		0,15		
23	ISO 12677	YES		0,280	0,270	0,275		1,94		
24	ISO 12677			0,384	0,386	0,385		0,30		
25										
26	XRF pellet			0,429	0,439	0,434		1,31		
27	ISO 12677	YES		0,340	0,350	0,345		0,51		
28	ISO 12677	YES		0,340	0,340	0,340		0,61		
41	ICP-OES	YES	ISO 11885-E22	0,320		0,320		1,02		
29	ISO 12677	YES		0,408	0,417	0,413		0,87		
30	XRF bead			0,686	0,688	x0,687		6,48	Outlier	x
31	ISO 12677	YES								
35	ISO 12677			0,444	0,438	0,441		1,45		
37	ICP-OES		Borax fusion	0,344		0,344		0,53		
38	ISO 12677	YES		0,359	0,358	0,359		0,23		
39	XRF bead			0,129	0,129	x0,129		4,92	Outlier	x
40	ISO 12677			0,363	0,362	0,363		0,15		
					n	13				
					Mean	0,370				
					Max	0,441				
					Min	0,275				
					Stdev s	0,049				
					C(95%)	0,030	C(95%)=t*s/SQR(n) t(13)=2,179			

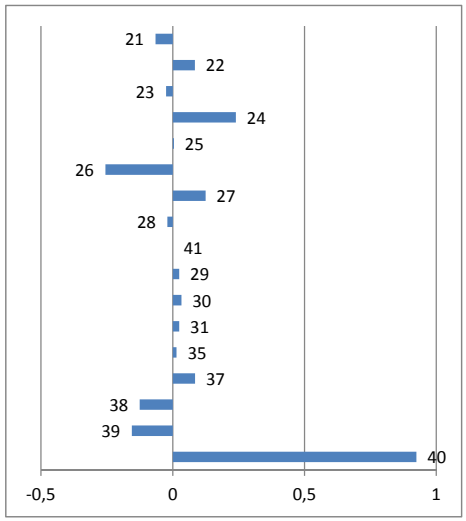


FLX-CRM 111

P2O5	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:30:11	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=12 VG=2,285	confirmed
21	ISO 12677			0,082	0,079	0,081		1,02		
22	ISO 12677		reconstitution	0,092	0,087	0,090		0,16		
23	ISO 12677	YES		0,087	0,086	0,087		0,24		
24	ISO 12677			0,099	0,100	0,099		1,45		
25	XRF bead			<0,1	<0,1					
26	XRF pellet			0,222	0,211	x0,217		16,81	Outlier	x
27	ISO 12677	YES		0,090	0,090	0,090		0,22		
28	ISO 12677	YES		0,080	0,100	0,090		0,22		
41	ICP-OES	YES	ISO 11885-E22	0,090		0,090		0,22		
29	ISO 12677	YES		0,085	0,086	0,086		0,37		
30	XRF bead			0,052	0,056	x0,054		4,48	Outlier	x
31	ISO 12677	YES		0,346	0,327	x0,337		32,49	Outlier	x
35	ISO 12677			0,100	0,099	0,099		1,44		
37	ICP-OES		aqua regia	0,071		0,071		2,26	Included	
38	ISO 12677	YES		0,092	0,092	0,092		0,48		
39	XRF bead			0,110	0,120	x0,115		3,49	Outlier	x
40	ISO 12677			0,087	0,085	0,086		0,30		
					n	12				
					Mean	0,088				
					Max	0,099				
					Min	0,071				
					Stdev s	0,008				
					C(95%)	0,005	C(95%)=t*s/SQR(n) t(12)=2,201			

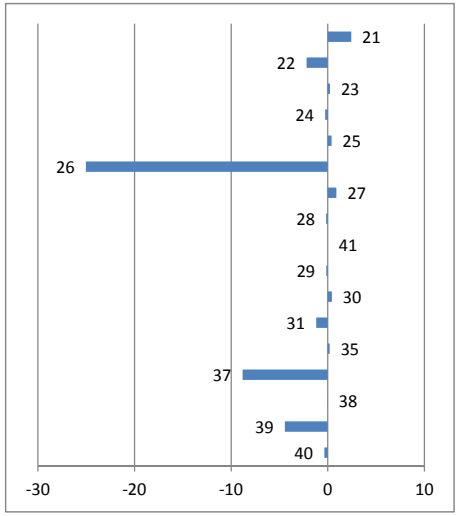


LOI (@ 1025°C)	FLX-CRM 111			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:30:16	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	gravimetric			0,510	0,510	0,510		0,82		
22	ISO 12677			0,635	0,684	0,660		1,04		
23	ISO 12677	YES		0,560	0,540	0,550		0,32		
24	ISO 12677			0,820	0,810	x0,815		2,98	Outlier	x
25	gravimetric			0,580	0,580	0,580		0,05		
26				0,330	0,310	x0,320		3,18	Outlier	x
27	ISO 12677	YES		0,700	0,700	0,700		1,55		
28	ISO 12677	YES		0,550	0,560	0,555		0,26		
41										
29	DIN 51081	YES	1 h at 1025°C	0,590	0,610	0,600		0,30		
30	gravimetric			0,592	0,625	0,609		0,41		
31	ISO 12677			0,600	0,600	0,600		0,30		
35	ISO 12677			0,590	0,590	0,590		0,18		
37	gravimetric			0,660		0,660		1,05		
38	ISO 12677	YES		0,440	0,460	0,450		1,56		
39	gravimetric			0,450	0,390	0,420		1,94		
40	ISO 12677			1,500	1,500	x1,500		11,50	Outlier	x
					n	13				
					Mean	0,576				
					Max	0,700				
					Min	0,420				
					Stdev s	0,080				
					C(95%)	0,049	C(95%)=t*s/SQR(n) t(13)=2,179			

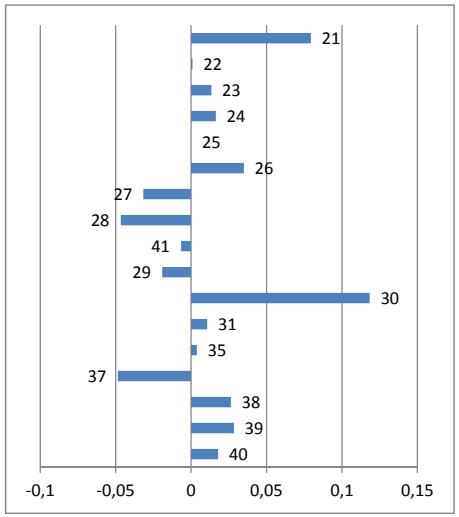


FLX-CRM 112

Al2O3	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:47:41	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=11 VG=2,234	confirmed
21	ISO 12677			82,462	82,025	x82,244		4,54	Outlier	x
22	ISO 12677		reconstitution	77,563	77,673	x77,618		4,10	Outlier	x
23	ISO 12677	YES		80,020	80,050	80,035		0,41		
24	ISO 12677			79,495	79,594	79,545		0,50		
25	XRF bead	YES		80,340	80,060	80,200		0,72		
26	XRF pellet			55,350	54,190	x54,770		46,75	Outlier	x
27	ISO 12677	YES		80,500	80,900	80,700		1,66		
28	ISO 12677	YES		79,600	79,700	79,650		0,30		
41										
29	ISO 12677	YES		79,652	79,681	79,667		0,27		
30	XRF bead			79,610	80,860	80,235		0,79		
31	ISO 12677	YES		78,620	78,620	78,620		2,23	Included	
35	ISO 12677			79,832	80,193	80,013		0,37		
37	ICP-OES		Borax fusion	70,990		x70,990		16,47	Outlier	x
38	ISO 12677	YES		79,790	79,842	79,816		0,01		
39	XRF bead			75,230	75,510	x75,370		8,29	Outlier	x
40	ISO 12677			79,574	79,351	79,463		0,65		
					n	11				
					Mean	79,813				
					Max	80,700				
					Min	78,620				
					Stdev s	0,536				
					C(95%)	0,360	C(95%)=t*s/SQR(n) t(11)=2,228			

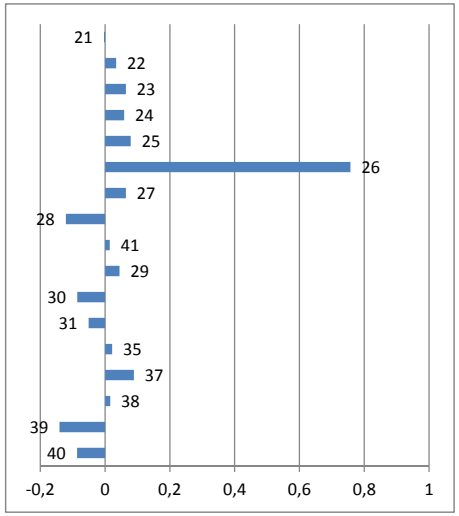


CaO	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:47:47	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			0,205	0,246	x0,226		2,93	Outlier	x
22	ISO 12677		reconstitution	0,141	0,154	0,148		0,03		
23	ISO 12677	YES		0,167	0,153	0,160		0,49		
24	ISO 12677			0,165	0,161	0,163		0,60		
25	XRF bead	YES		<0,1	<0,1					
26	XRF pellet			0,182	0,181	0,182		1,29		
27	ISO 12677	YES		0,110	0,120	0,115		1,17		
28	ISO 12677	YES		0,100	0,100	0,100		1,72		
41	ICP-OES	YES	ISO 11885-E22	0,140		0,140		0,24		
29	ISO 12677	YES		0,124	0,131	0,128		0,71		
30	XRF bead			0,270	0,260	x0,265		4,36	Outlier	x
31	ISO 12677	YES		0,158	0,157	0,157		0,39		
35	ISO 12677			0,150	0,151	0,150		0,14		
37	ICP-OES		aqua regia	0,098		0,098		1,79		
38	ISO 12677	YES		0,178	0,168	0,173		0,97		
39	XRF bead			0,200	0,150	0,175		1,05		
40	ISO 12677			0,169	0,160	0,165		0,66		
					n	14				
					Mean	0,147				
					Max	0,182				
					Min	0,098				
					Stdev s	0,027				
					C(95%)	0,016	C(95%)=t*s/SQR(n) t(14)=2,160			

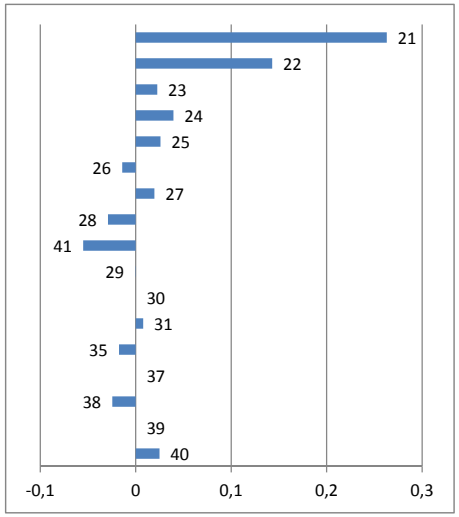


FLX-CRM 112

Fe2O3	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:47:53	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=16 VG=2,443	confirmed
21	ISO 12677			0,338	0,307	0,323		0,04		
22	ISO 12677		reconstitution	0,360	0,360	0,360		0,46		
23	ISO 12677	YES		0,400	0,380	0,390		0,87		
24	ISO 12677			0,379	0,390	0,385		0,80		
25	XRF bead	YES		0,400	0,410	0,405		1,07		
26	XRF pellet			1,027	1,138	x1,083		10,25	Outlier	x
27	ISO 12677	YES		0,390	0,390	0,390		0,87		
28	ISO 12677	YES		0,210	0,200	0,205		1,63		
41	ICP-OES	YES	ISO 11885-E22	0,340		0,340		0,19		
29	ISO 12677	YES		0,399	0,342	0,371		0,61		
30	XRF bead			0,240	0,240	0,240		1,16		
31	ISO 12677	YES		0,281	0,269	0,275		0,69		
35	ISO 12677			0,346	0,350	0,348		0,30		
37	ICP-OES		Borax fusion	0,415		0,415		1,21		
38	ISO 12677	YES		0,356	0,327	0,342		0,21		
39	XRF bead			0,180	0,190	0,185		1,91		
40	ISO 12677			0,253	0,226	0,240		1,17		
					n	16				
					Mean	0,326				
					Max	0,415				
					Min	0,185				
					Stdev s	0,074				
					C(95%)	0,039	C(95%)=t*s/SQR(n) t(16)=2,131			

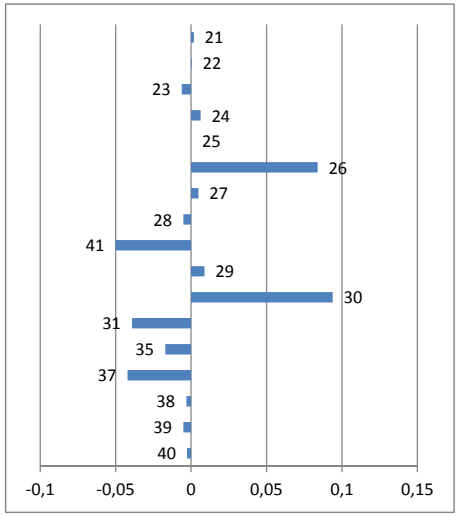


HfO2	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:17:35	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=12 VG=2,285	confirmed
21	XRF pellet			0,362	0,362	x0,362		9,31	Outlier	x
22	ISO 12677			0,243	0,241	x0,242		5,06	Outlier	x
23	ISO 12677	YES		0,121	0,122	0,122		0,80		
24	ISO 12677			0,138	0,139	0,139		1,40		
25	XRF bead			0,130	0,120	0,125		0,92		
26	XRF pellet			0,082	0,087	0,085		0,50		
27	ICP-OES	YES		0,117	0,120	0,119		0,69		
28	ISO 12677	YES		0,070	0,070	0,070		1,03		
41	ICP-OES	YES	ISO 11885-E22	0,044		0,044		1,95		
29	ISO 12677	YES		0,100	0,097	0,099		0,01		
30										
31	ISO 12677	YES		0,107	0,107	0,107		0,28		
35	ISO 12677			0,082	0,081	0,082		0,62		
37										
38	ISO 12677	YES		0,070	0,079	0,075		0,87		
39										
40	ISO 12677			0,124	0,124	0,124		0,89		
					n	12				
					Mean	0,099				
					Max	0,139				
					Min	0,044				
					Stdev s	0,028				
					C(95%)	0,018	C(95%)=t*s/SQR(n) t(12)=2,201			

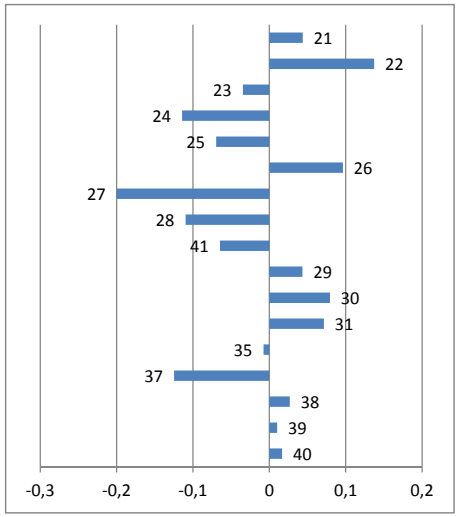


FLX-CRM 112

K2O	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:04	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	ISO 12677			0,092	0,092	0,092		0,35		
22	ISO 12677		reconstitution	0,075	0,106	0,091		0,07		
23	ISO 12677	YES		0,087	0,081	0,084		1,16		
24	ISO 12677			0,099	0,094	0,097		1,20		
25	XRF bead	YES		<0,1	<0,1					
26	XRF pellet			0,176	0,172	x0,174		15,80	Outlier	x
27	ICP-OES	YES		0,095	0,095	0,095		0,91		
28	ISO 12677	YES		0,080	0,090	0,085		0,97		
41	ICP-OES	YES	ISO 11885-E22	0,040		x0,040		9,45	Outlier	x
29	ISO 12677	YES		0,100	0,098	0,099		1,67		
30	XRF bead			0,177	0,190	x0,184		17,68	Outlier	x
31	ISO 12677	YES		0,051	0,052	x0,051		7,38	Outlier	x
35	ISO 12677			0,071	0,074	x0,073		3,23	Outlier	x
37	ICP-OES		aqua regia	0,048		x0,048		7,94	Outlier	x
38	ISO 12677	YES		0,089	0,085	0,087		0,59		
39	XRF bead			0,090	0,080	0,085		0,97		
40	ISO 12677			0,089	0,086	0,088		0,50		
					n	10				
					Mean	0,090				
					Max	0,099				
					Min	0,084				
					Stdev s	0,005				
					C(95%)	0,004	C(95%)=t*s/SQR(n) t(10)=2,262			

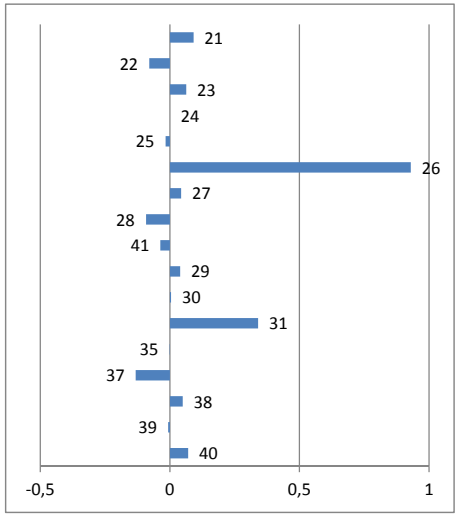


MgO	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:08	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=16 VG=2,443	confirmed
21	ISO 12677			0,789	0,808	0,799		0,55		
22	ISO 12677		reconstitution	0,901	0,883	0,892		1,72		
23	ISO 12677	YES		0,720	0,720	0,720		0,44		
24	ISO 12677			0,651	0,630	0,641		1,43		
25	XRF bead	YES		0,690	0,680	0,685		0,87		
26	XRF pellet			0,864	0,838	0,851		1,21		
27	ISO 12677	YES		0,570	0,540	x0,555		2,50	Outlier	x
28	ISO 12677	YES		0,660	0,630	0,645		1,38		
41	ICP-OES	YES	ISO 11885-E22	0,690		0,690		0,81		
29	ISO 12677	YES		0,781	0,815	0,798		0,54		
30	XRF bead			0,824	0,844	0,834		0,99		
31	ISO 12677	YES		0,819	0,833	0,826		0,89		
35	ISO 12677			0,779	0,715	0,747		0,10		
37	ICP-OES		aqua regia	0,630		0,630		1,56		
38	ISO 12677	YES		0,781	0,782	0,782		0,34		
39	XRF bead			0,760	0,770	0,765		0,13		
40	ISO 12677			0,772	0,771	0,772		0,21		
					n	16				
					Mean	0,755				
					Max	0,892				
					Min	0,630				
					Stdev s	0,080				
					C(95%)	0,042	C(95%)=t*s/SQR(n) t(16)=2,131			

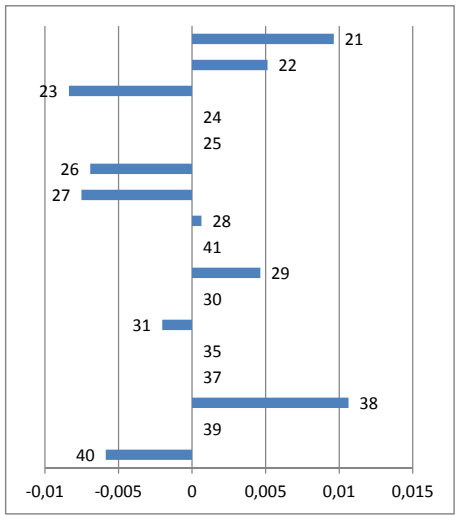


FLX-CRM 112

Na2O	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:13	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			0,348	0,368	0,358		1,38		
22	ISO 12677		reconstitution	0,184	0,191	0,188		1,20		
23	ISO 12677	YES		0,330	0,330	0,330		0,96		
24										
25	ICP-OES	YES		0,260	0,240	0,250		0,25		
26	XRF pellet			1,233	1,158	x1,196		14,04	Outlier	x
27	ICP-OES	YES		0,310	0,310	0,310		0,66		
28	ISO 12677	YES		0,180	0,170	0,175		1,38		
41	ICP-OES	YES	ISO 11885-E22	0,230		0,230		0,55		
29	ISO 12677	YES		0,312	0,301	0,307		0,60		
30	XRF bead			0,277	0,266	0,272		0,07		
31	ISO 12677	YES		0,628	0,586	x0,607		5,14	Outlier	x
35	ISO 12677			0,259	0,272	0,266		0,02		
37	ICP-OES		aqua regia	0,135		0,135		1,99		
38	ISO 12677	YES		0,316	0,317	0,317		0,75		
39	XRF bead			0,260	0,260	0,260		0,10		
40	ISO 12677			0,332	0,342	0,337		1,06		
					n	14				
					Mean	0,267				
					Max	0,358				
					Min	0,135				
					Stdev s	0,066				
					C(95%)	0,038	C(95%)=t*s/SQR(n) t(14)=2,160			

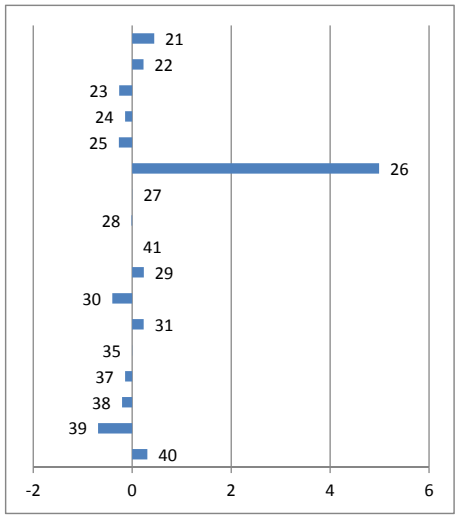


NiO	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:31:40	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	XRF pellet			0,019	0,019	0,019		1,34		
22	ISO 12677		reconstitution	0,014	0,015	0,015		0,71		
23	ISO 12677	YES		0,001	0,001	0,001		1,16		
24	ISO 12677			<0,005	<0,005					
25										
26	XRF pellet			0,002	0,003	0,002		0,96		
27	ICP-OES	YES		0,002	0,002	0,002		1,04		
28	ISO 12677	YES		0,010	0,010	0,010		0,09		
41	ICP-OES	YES	ISO 11885-E22	<0,005						
29	ISO 12677	YES		0,013	0,015	0,014		0,64		
30										
31	ISO 12677	YES		0,007	0,007	0,007		0,28		
35	ISO 12677			<0,004	<0,004					
37										
38	ISO 12677	YES		0,020	0,020	0,020		1,48		
39										
40	ISO 12677			0,004	0,003	0,004		0,81		
					n	10				
					Mean	0,009				
					Max	0,020				
					Min	0,001				
					Stdev s	0,007				
					C(95%)	0,005	C(95%)=t*s/SQR(n) t(10)=2,262			

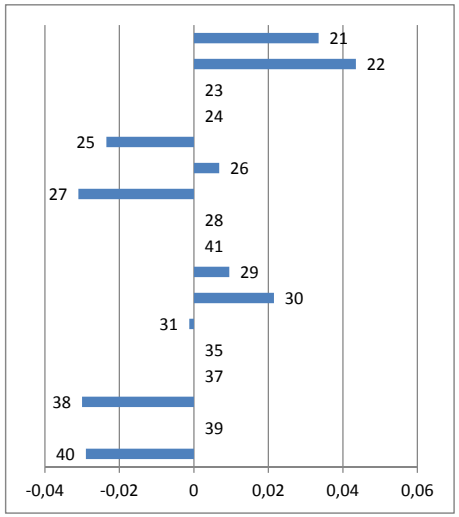


FLX-CRM 112

SiO2	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:20	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=14 VG=2,371	confirmed
21	ISO 12677			12,410	12,810	12,610		1,75		
22	ISO 12677		reconstitution	12,357	12,427	12,392		0,90		
23	ISO 12677	YES		11,920	11,880	11,900		1,04		
24	ISO 12677			11,990	12,050	12,020		0,57		
25	XRF bead	YES		11,880	11,910	11,895		1,06		
26	XRF pellet			17,280	17,030	x17,155		19,61	Outlier	x
27	ISO 12677	YES		12,270	12,060	12,165		0,00		
28	ISO 12677	YES		12,200	12,100	12,150		0,06		
41										
29	ISO 12677	YES		12,403	12,392	12,398		0,92		
30	XRF bead			11,810	11,710	11,760		1,59		
31	ISO 12677	YES		12,420	12,370	12,395		0,91		
35	ISO 12677			12,223	12,104	12,164		0,00		
37	ICP-OES		Borax fusion	12,020		12,020		0,57		
38	ISO 12677	YES		12,043	11,875	11,959		0,81		
39	XRF bead			11,530	11,420	x11,475		2,71	Outlier	x
40	ISO 12677			12,511	12,430	12,471		1,20		
					n	14				
					Mean	12,164				
					Max	12,610				
					Min	11,760				
					Stdev s	0,254				
					C(95%)	0,147	C(95%)=t*s/SQR(n) t(14)=2,160			

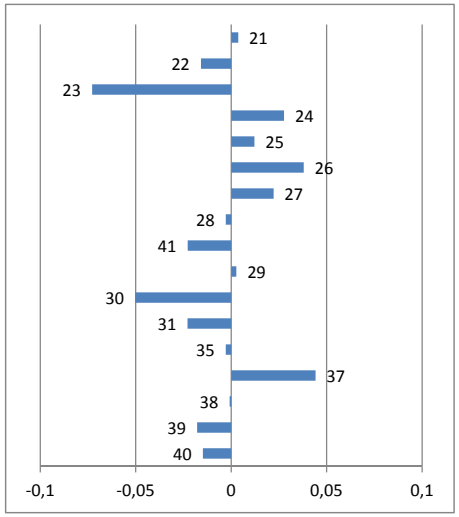


Total S expressed as SO3	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:27	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	HF-IR			0,077	0,077	0,077		1,21		
22	ISO 12677		reconstitution	0,086	0,088	0,087		1,57		
23	ISO 12677	YES		<0,03	<0,03					
24										
25	HF-IR			0,010	0,030	0,020		0,85		
26	XRF pellet			0,041	0,059	0,050		0,25		
27	HF-IR	YES		0,010	0,015	0,013		1,12		
28	ISO 12677	YES		<0,01	<0,01					
41										
29	ISO 12677	YES		0,042	0,064	0,053		0,34		
30	XRF bead			0,065	0,065	0,065		0,78		
31	ISO 12677	YES		0,040	0,045	0,042		0,05		
35	ISO 12677			<0,010	<0,010					
37										
38	HF-IR		DIN 51095-1	0,016	0,011	0,014		1,09		
39										
40	ISO 12677			0,012	0,017	0,015		1,05		
					n	10				
					Mean	0,044				
					Max	0,087				
					Min	0,013				
					Stdev s	0,028				
					C(95%)	0,020	C(95%)=t*s/SQR(n) t(10)=2,262			

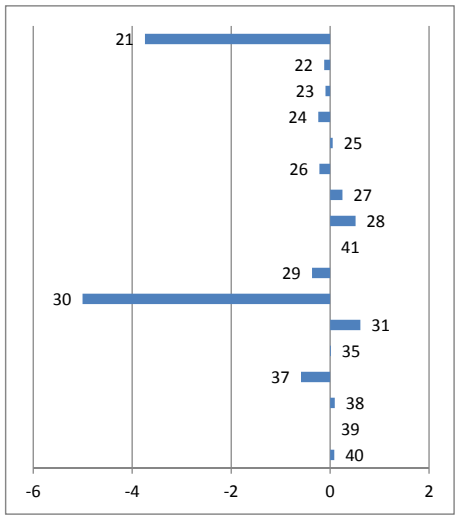


FLX-CRM 112

TiO2	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:32	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=16 VG=2,443	confirmed
21	ISO 12677			0,277	0,276	0,277		0,15		
22	ISO 12677		reconstitution	0,257	0,257	0,257		0,64		
23	ISO 12677	YES		0,200	0,200	x0,200		2,94	Outlier	x
24	ISO 12677			0,297	0,304	0,301		1,12		
25	XRF bead	YES		0,280	0,290	0,285		0,49		
26	XRF pellet			0,315	0,307	0,311		1,53		
27	ISO 12677	YES		0,290	0,300	0,295		0,90		
28	ISO 12677	YES		0,270	0,270	0,270		0,11		
41	ICP-OES	YES	ISO 11885-E22	0,250		0,250		0,92		
29	ISO 12677	YES		0,280	0,271	0,276		0,11		
30	XRF bead			0,223	0,222	0,223		2,03		
31	ISO 12677	YES		0,248	0,252	0,250		0,92		
35	ISO 12677			0,273	0,267	0,270		0,11		
37	ICP-OES		Borax fusion	0,317		0,317		1,78		
38	ISO 12677	YES		0,277	0,267	0,272		0,03		
39	XRF bead			0,260	0,250	0,255		0,72		
40	ISO 12677			0,261	0,255	0,258		0,60		
					n	16				
					Mean	0,273				
					Max	0,317				
					Min	0,223				
					Stdev s	0,025				
					C(95%)	0,013	C(95%)=t*s/SQR(n) t(16)=2,131			

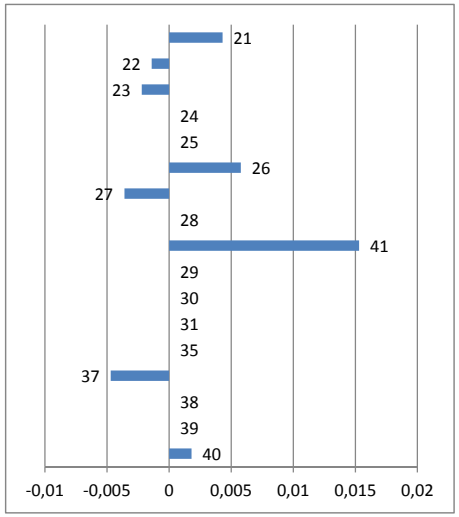


ZrO2	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:42	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	XRF pellet			2,208	2,208	x2,208		11,23	Outlier	x
22	ISO 12677		reconstitution	5,706	5,951	5,829		0,36		
23	ISO 12677	YES		5,830	5,880	5,855		0,28		
24	ISO 12677			5,704	5,715	5,710		0,72		
25	XRF bead			6,010	5,990	6,000		0,15		
26	XRF pellet			5,745	5,720	5,733		0,65		
27	ISO 12677	YES		6,300	6,100	6,200		0,75		
28	ISO 12677	YES		6,470	6,460	6,465		1,55		
41										
29	ISO 12677	YES		5,573	5,593	5,583		1,10		
30	XRF bead			0,950	0,942	x0,946		15,02	Outlier	x
31	ISO 12677	YES		6,518	6,605	6,562		1,84		
35	ISO 12677			6,005	5,927	5,966		0,05		
37	ICP-OES		Borax fusion	5,360		5,360		1,77		
38	ISO 12677	YES		5,962	6,126	6,044		0,28		
39										
40	ISO 12677			6,045	6,022	6,034		0,25		
					n	13				
					Mean	5,949				
					Max	6,562				
					Min	5,360				
					Stdev s	0,333				
					C(95%)	0,201	C(95%)=t*s/SQR(n) t(13)=2,179			

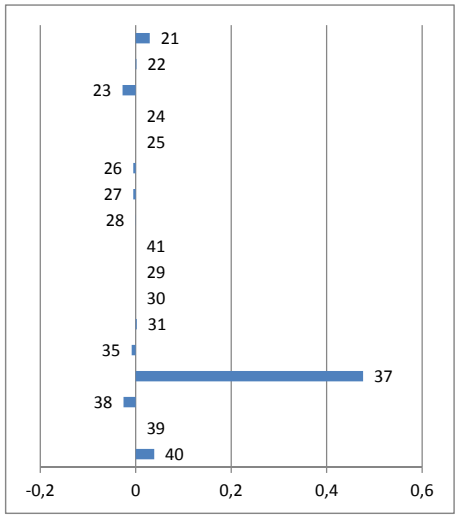


FLX-CRM 112

Co3O4	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:46:51	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=7 VG=1,938	confirmed
21	XRF pellet			0,013	0,013	0,013		1,07		
22	ISO 12677			0,007	0,007	0,007		0,35		
23	ISO 12677	YES		0,006	0,007	0,007		0,55		
24	ISO 12677			<0,02	<0,02					
25										
26	XRF pellet			0,014	0,015	0,014		1,44		
27	ICP-OES	YES		0,005	0,005	0,005		0,89		
28	ISO 12677	YES		<0,01	<0,01					
41	ICP-OES	YES	ISO 11885-E22	0,024		x0,024		3,81	Outlier	x
29										
30										
31	ISO 12677	YES								
35	ISO 12677			<0,005	<0,005					
37	ICP-OES		aqua regia	0,004		0,004		1,17		
38	ISO 12677	YES		<0,01	<0,01					
39										
40	ISO 12677			0,011	0,010	0,011		0,45		
					n	7				
					Mean	0,009				
					Max	0,014				
					Min	0,004				
					Stdev s	0,004				
					C(95%)	0,004	C(95%)=t*s/SQR(n) t(7)=2,447			

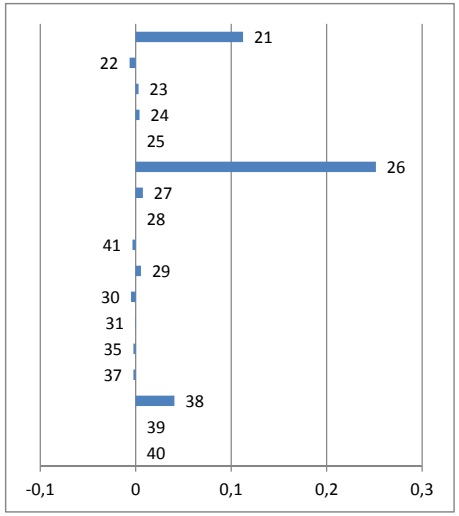


WO3	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:47:17	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	XRF pellet			0,070	0,070	0,070		1,41		
22	ISO 12677		reconstitution	0,043	0,041	0,042		0,07		
23	ISO 12677	YES		0,013	0,013	0,013		1,32		
24										
25										
26	XRF pellet			0,035	0,036	0,035		0,24		
27	ICP-OES	YES		0,034	0,037	0,036		0,24		
28	ISO 12677	YES		0,040	0,040	0,040		0,03		
41										
29										
30										
31	ISO 12677	YES		0,043	0,043	0,043		0,11		
35	ISO 12677			0,033	0,031	0,032		0,41		
37	ICP-OES		aqua regia	0,517		x0,517		22,80	Outlier	x
38	ISO 12677	YES		0,010	0,020	0,015		1,22		
39										
40	ISO 12677			0,076	0,083	0,080		1,86		
					n	10				
					Mean	0,041				
					Max	0,080				
					Min	0,013				
					Stdev s	0,021				
					C(95%)	0,015	C(95%)=t*s/SQR(n) t(10)=2,262			

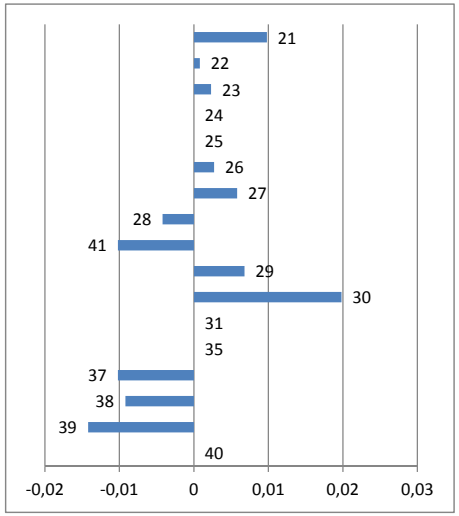


FLX-CRM 112

Cr2O3	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:51	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	XRF pellet			0,130	0,130	x0,130		23,68	Outlier	x
22	ISO 12677		reconstitution	0,011	0,011	0,011		1,36		
23	ISO 12677	YES		0,020	0,021	0,021		0,64		
24	ISO 12677			0,021	0,022	0,022		0,85		
25										
26	XRF pellet			0,242	0,295	x0,269		52,93	Outlier	x
27	ISO 12677	YES		0,030	0,020	0,025		1,59		
28	ISO 12677	YES		<0,01	<0,01					
41	ICP-OES	YES	ISO 11885-E22	0,014		0,014		0,73		
29	ISO 12677	YES		0,022	0,024	0,023		1,17		
30	XRF bead			0,013	0,012	0,013		1,04		
31	ISO 12677	YES		0,016	0,018	0,017		0,10		
35	ISO 12677			0,013	0,017	0,015		0,50		
37	ICP-OES		Borax fusion	0,015		0,015		0,52		
38	ISO 12677	YES		0,059	0,057	x0,058		8,53	Outlier	x
39										
40	ISO 12677									
					n	10				
					Mean	0,017				
					Max	0,025				
					Min	0,011				
					Stdev s	0,005				
					C(95%)	0,003	C(95%)=t*s/SQR(n) t(10)=2,262			

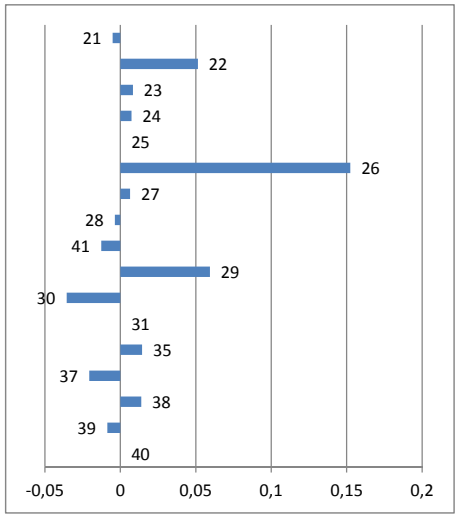


Mn3O4	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:48:57	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=12 VG=2,285	confirmed
21	XRF pellet			0,034	0,034	0,034		0,98		
22	ISO 12677		reconstitution	0,026	0,024	0,025		0,08		
23	ISO 12677	YES		0,028	0,025	0,027		0,23		
24	ISO 12677			<0,03	<0,03					
25										
26	XRF pellet			0,026	0,028	0,027		0,27		
27	ISO 12677	YES		0,030	0,030	0,030		0,58		
28	ISO 12677	YES		0,020	0,020	0,020		0,42		
41	ICP-OES	YES	ISO 11885-E22	0,014		0,014		1,02		
29	ISO 12677	YES		0,029	0,033	0,031		0,68		
30	XRF bead			0,043	0,045	0,044		1,99		
31	ISO 12677	YES								
35	ISO 12677			<0,010	<0,010					
37	ICP-OES		Borax fusion	0,014		0,014		1,02		
38	ISO 12677	YES		0,020	0,010	0,015		0,92		
39	XRF bead			0,010	0,000	0,010		1,42		
40	ISO 12677									
					n	12				
					Mean	0,024				
					Max	0,044				
					Min	0,010				
					Stdev s	0,010				
					C(95%)	0,006	C(95%)=t*s/SQR(n) t(12)=2,201			



FLX-CRM 112

P2O5	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:49:02	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=10 VG=2,176	confirmed
21	ISO 12677			0,069	0,068	0,069		0,43		
22	ISO 12677		reconstitution	0,126	0,123	x0,125		4,34	Outlier	x
23	ISO 12677	YES		0,082	0,082	0,082		0,71		
24	ISO 12677			0,081	0,081	0,081		0,62		
25	XRF bead	YES		<0,1	<0,1					
26	XRF pellet			0,230	0,222	x0,226		12,87	Outlier	x
27	ISO 12677	YES		0,080	0,080	0,080		0,54		
28	ISO 12677	YES		0,070	0,070	0,070		0,30		
41	ICP-OES	YES	ISO 11885-E22	0,061		0,061		1,06		
29	ISO 12677	YES		0,130	0,136	x0,133		5,01	Outlier	x
30	XRF bead			0,037	0,039	x0,038		3,01	Outlier	x
31	ISO 12677	YES		<0.00069	<0.00069					
35	ISO 12677			0,088	0,088	0,088		1,22		
37	ICP-OES		aqua regia	0,053		0,053		1,74		
38	ISO 12677	YES		0,089	0,086	0,088		1,17		
39	XRF bead			0,070	0,060	0,065		0,73		
40	ISO 12677									
					n	10				
					Mean	0,074				
					Max	0,088				
					Min	0,053				
					Stdev s	0,012				
					C(95%)	0,008	C(95%)=t*s/SQR(n) t(10)=2,262			



LOI (@ 1025°C)	FLX-CRM 112			Mass %	Mass %	Mass %	Freitag, 12. Oktober 2012 11:49:06	z-score	Grubbs	Outlier
Lab.No:	Method	ISO 17025	Remark	Meas #1	Meas #2	Mean		z>3	n=13 VG=2,331	confirmed
21	gravimetric			5,350	5,200	5,275		1,18		
22	ISO 12677			5,559	5,559	5,559		1,07		
23	ISO 12677	YES		5,020	4,990	x5,005		3,32	Outlier	x
24	ISO 12677			5,200	5,270	5,235		1,50		
25	gravimetric			4,220	4,240	x4,230		9,46	Outlier	x
26	ISO 12677			5,260	5,280	5,270		1,22		
27	ISO 12677	YES		5,660	5,660	5,660		1,87		
28	ISO 12677	YES		5,400	5,430	5,415		0,07		
41										
29	DIN 51081	YES		5,370	5,360	5,365		0,47		
30	gravimetric			5,441	5,533	5,487		0,50		
31	ISO 12677			5,400	5,400	5,400		0,19		
35	ISO 12677			5,380	5,380	5,380		0,35		
37	gravimetric			5,480		5,480		0,45		
38										
39	950°C			5,390	5,430	5,410		0,11		
40	ISO 12677			5,657	5,488	5,573		1,18		
					n	13				
					Mean	5,424				
					Max	5,660				
					Min	5,235				
					Stdev s	0,126				
					C(95%)	0,076	C(95%)=t*s/SQR(n) t(13)=2,179