

# ANNEXES



**Annex 1: List of participating laboratories**

Lab name	Institute	Contact person	Street	Zip code	Town	Country	Email
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## Annex 2: Coding system

**Table 2.1: Codes for sieving and milling**

Code	Description
0	No information
1	Reference method
2	Milling
2.1	To 150 micrometer
2.2	As fine as possible
9	Other method

**Table 2.2: Codes removal compounds**

Code	Description
0	No information
1	No removal
2	Removal of organic carbon
2.1	Hydrogen peroxide
2.2	Pre-ignition at 850 °C
3	Removal of soluble salts and gypsum
3.1	Washing with water
4	Removal of carbonates
4.1	Hydrochloric acid
4.2	Hydrochloric acid/Calcium chloride

**Table 2.3: Codes pre-treatment**

Code	Description
0	No information
1	No pretreatment
2	Extractions
2.7	Extraction H <sub>2</sub> O
2.8	Extraction HNO <sub>3</sub>
2.3	Extraction aqua regia
3	Wet ashings at room pressure (open system)
3.1	Wet ashing HNO <sub>3</sub>
3.2	Wet ashing HNO <sub>3</sub> /HF
3.3	Wet ashing HNO <sub>3</sub> /HClO <sub>4</sub>
3.4	Wet ashing HNO <sub>3</sub> /HClO <sub>4</sub> /HF
3.5	Wet ashing HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub>
3.6	Wet ashing HNO <sub>3</sub> /HClO <sub>4</sub> /H <sub>2</sub> SO <sub>4</sub>
3.7	Wet ashing HNO <sub>3</sub> /HClO <sub>4</sub> /CaCl <sub>2</sub>
3.8	Wet ashing HNO <sub>3</sub> /HClO <sub>4</sub> /H <sub>2</sub> O <sub>2</sub>
3.9	Wet ashing HNO <sub>3</sub> ,/HClO <sub>4</sub> /HCl
3.10	Wet ashing HNO <sub>3</sub> /H <sub>2</sub> SO <sub>4</sub>
3.11	Wet ashing aqua regia
3.20	Wet ashing HClO <sub>4</sub> /H <sub>2</sub> O <sub>2</sub>
3.21	Wet ashing HClO <sub>4</sub> /H <sub>2</sub> SO <sub>4</sub>
3.31	Wet ashing H <sub>2</sub> SO <sub>4</sub> /H <sub>2</sub> O <sub>2</sub>
3.32	Wet ashing H <sub>2</sub> SO <sub>4</sub> /K <sub>2</sub> CrO <sub>7</sub>

3.50	Kjeldahl H <sub>2</sub> SO <sub>4</sub> / Se-catalyst
3.51	Kjeldahl H <sub>2</sub> SO <sub>4</sub> /Cu-catalyst
3.52	Kjeldahl H <sub>2</sub> SO <sub>4</sub> /Ti-Cu-catalyst
3.53	Kjeldahl H <sub>2</sub> SO <sub>4</sub> /Hg-catalyst
4	Pressure digestions (closed system)
4.1	Pressure digestion HNO <sub>3</sub>
4.2	Pressure digestion HNO <sub>3</sub> /HF
4.3	Pressure digestion HNO <sub>3</sub> /HClO <sub>4</sub>
4.4	Pressure digestion HNO <sub>3</sub> /HClO <sub>4</sub> /HF
4.5	Pressure digestion HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> ,
5	Microwave pressure digestions (closed system)
5.1	Microwave digestion HNO <sub>3</sub>
5.2	Microwave digestion HNO <sub>3</sub> /HF
5.3	Microwave digestion HNO <sub>3</sub> /HClO <sub>4</sub>
5.4	Microwave digestion HNO <sub>3</sub> /HClO <sub>4</sub> /HF
5.5	Microwave digestion HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub>
5.6	Microwave digestion HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> /HF
5.7	Microwave digestion HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> /HCl
5.8	Microwave aqua regia
6	Dry ashings
6.1	Dry ashing dissolution with HNO <sub>3</sub>
6.2	Dry ashing dissolution with HNO <sub>3</sub> /MgNO <sub>3</sub>
6.3	Dry ashing dissolution with HNO <sub>3</sub> /HF
6.4	Dry ashing dissolution with HNO <sub>3</sub> /HCl
6.5	Dry ashing dissolution with HCl
6.6	Dry ashing dissolution with HCl/HF
6.7	Dry ashing dissolution with H <sub>2</sub> SO <sub>4</sub>
7	Oxygen ashings
7.1	Oxygen ashing Schöniger
7.2	Oxygen ashing Wickbold
7.3	Oxygen ashing calorimetric bomb
9	X-ray-pretreatments and other pretreatments
9.1	Material pressed (pellet)
9.2	Material melted and formed (tablet)
9.5	Melting (NaOH)
2.1	Extraction BaCl <sub>2</sub>
2.5	Extraction total with LiBO <sub>2</sub>
2.2	Extraction KCl
2.4	Extraction total with HF/HClO <sub>4</sub>
2.6	Extraction with Acid Ammonium Oxalate
2.7	Extraction H <sub>2</sub> O
2.9	Extraction CaCl <sub>2</sub>
2.11	Single
2.12	Triple

**Table 2.4: Codes determination**

Code	Description
0	No information
1	No detection

10	Elemental-analyzers
11	Kjeldahl-apparatus
11.1	Kjeldahl-apparatus (Tecator)
11.2	Kjeldahl-apparatus (Gerhardt)
11.3	Kjeldahl-apparatus (Büchi)
12	N-Analyzer
12.1	N-Analyzer (Heraeus/Elementar )
12.2	N-Analyzer (Vario)
12.3	N-Analyzer (Leco)
13	C-Analyzer
13.1	C-Analyzer (Leco)
14	S-Analyzer
14.1	S-Analyzer (Leco)
15	C/N-Analyzer
15.1	C/N-Analyzer (Carlo-Erba=CE Instruments)
15.2	C/N-Analyzer (Leco)
15.3	C/N-Analyzer (Heraeus/Elementar)
15.4	C/N-Analyzer (Vario)
16	C/S-Analyzer
16.1	C/S-Analyzer (Leco)
17	C/N/S-Analyzer
17.1	C/N/S-Analyzer (Leco)
18	C/N/H-Analyzer
18.1	C/N/H-Analyzer (Leco)
18.2	C/H/N-Analyzer (Heraeus/Elementar)
20	Mono-Atom-Spectrometry-Techniques
21	AAS-flame technique
21.1	AAS-flame technique (C <sub>2</sub> H <sub>2</sub> /Air)
21.2	AAS-flame technique (C <sub>2</sub> H <sub>2</sub> /N <sub>2</sub> O)
22	AAS-flameless (electrothermal technique)
24	AAS-hydride technique
25	AAS-cold vapor technique
26	AFS-hydride-technique
28	AES-Flame photometer
30	Multi-Atom-Spectrometry-techniques
31	ICP-AES without Ultrasonic nebulisation
32	ICP-AES with Ultrasonic nebulisation
35	ICP-MS
40	Physical techniques
41	X-ray-energy dispersive
42	X-ray-wavelength dispersive
45	Neutron activation analysis (NAA)
47	Gamma-spectroscopy
50	UV-VIS-spectrophotometry-techniques
51	Colorimetric N-Determination
51.1	Indophenol-blue-method
51.2	Flow Injection (FIAS)-NH <sub>3</sub> -Membrane-diffusion 566 nm
51.3	Continuous flow method, Indophenol blue
52	Colorimetric S-Determination

52.1	Nephelometry
53	Colorimetric P-Determination
53.1	Molybdene-blue-method
53.2	Vanadium-Mo-blue-method
53.3	Continuous flow method, Molybdene-blue
54	Colorimetric B-Determination
54.1	Azomethin - H
54.2	Carmin
60	Ion-chromatographic techniques
61.1	Anion-Chromatography w. chemical suppression
61.2	Anion-Chromatography w. electr. suppression
62.1	Kation-Chromatography w. chemical suppression
62.2	Kation-Chromatography w. electr. suppression
70	Electrochemical methods
71	Conductimetry
71.1	Conductometric titration
72	Potentiometry
72.1	pH
72.2	other ion selective electrodes
73	Potentiometric titrations
74	Stripping potentiometry
75	Voltammetry
76	Polarography
77	Amperometry
78	Electrophoresis
79	Redox potential
80	Classical analytical techniques
81	Gravimetry
82	Titration
82.1	NH <sub>4</sub> -back titration
82.2	Thiocyanate-titration
82.3	FeNH <sub>4</sub> SO <sub>4</sub> -Titration
82.4	Barimetric titration
82.5	AgNO <sub>3</sub> -Titration
90	other detections
17.2	C/N/S-Analyzer (Heraeus/Elementar)
13.2	TOC Analyzer
13.3	C-Analyzer (Heraeus/Elementar)
15.5	C/N-Analyzer (Hekatech)
17.3	C/N/S-Analyzer (Thermo Electron)
17.4	C/N/S-Analyzer (Carlo-Erba=CE Instruments)
19	C/H/N/S-Analyzer
48	Laser diffraction
52.2	Turbidimetry
55	Colorimetric C-Determination
81.1	Pipette
81.2	Hydrometer
83	Calcimeter (Scheibler unit)
84	Carbon determinations

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84.1	Loss on ignition
84.2	Walkley-Black
84.3	Tjurin method
91	Calculation





**Table 3.3: Reported methods for pre-treatment**

PARAMETER	3	6	7	8	10	11	12	13	14	18	21	23	26	30	31	32	34	35	36	37	38	40	42	45	48	53	54	
CaCO <sub>3</sub>	1	1	1	1	1		1	1	1		0	6.5	0	1	1	1	1	1	3	2	0	1	1		0	0		
Exchangeable Acidity	2.11		2.1	2.11	2.1	2		0	2.11		2.1		2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Al	2.11	2.1	2.1	2.11	2.1	2		2.1	2.11		2.1	2.1	2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Ca	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1	2.1	2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Fe	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1	2.1	2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable K	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1		2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Mg	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1	2.1	2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Mn	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1	2.1	2.12	2.11	2.11	2.1	2.11		2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Exchangeable Na	2.11	2.1	2.1	2.11	2.1	2	2.1	2.1	2.11		2.1		2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1	2.1	0		2.1	
Extractable Al	2.3	2.3	2.3	3.11	3.11	2.3		2.3	2.3			2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Ca	2.3	2.3	2.3	3.11	3.11	2.3	5.8	2.3	2.3			2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Cd	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	2.3	2.3		5.8	
Extractable Cr	2.3	2.3	3.11	3.11	3.11	2.3		2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Cu	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	2.3	2.3		5.8	
Extractable Fe	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3				2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Hg		2.3							2.3				1			2.3		1	2.3	2.3			2.3			2.3		
Extractable K	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3			2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	2.3	2.3	2	5.8	
Extractable Mg	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3			2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Mn	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3			2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	2.3	2.3		5.8	
Extractable Na	2.3	2.3	3.11		3.11	2.3	2.3	2.3	2.3				2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable Ni	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3		5.8	
Extractable P	2.3	2.3	3.11	3.11	3.11	2.3		2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3		2.3	2.3	2	5.8	
Extractable Pb	2.3	2.3	3.11	3.11	3.11	2.3	5.8	2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	2.3	2.3		5.8	
Extractable S	2.3	2.3	3.11	3.11	3.11	2.3		2.3	2.3				2.3	2.3	2.3	2.3	1		2.3	5.7		2.3			2.3		5.8	
Extractable Zn	2.3	2.3	3.11	3.11	3.11	2.3	2.3	2.3	2.3	5.7			2.3	2.3	2.3	2.3	2.3	2.3	2.3	5.7		2.3	2	3.11	2.3		5.8	
Free H	2.11			2.11	2.9			2.1	2.11		2.1			2.12	2.11	2.11	2.1	2.11	2.1	2.1	2.11	2.1	2.11	2.1		0	2.1	
Moisture	1	1	1	1	0	1		0	1		0	1	1	1	1	1	1		1	0	0	1	1	1	0	1	1	
OC	1	1	1	1	1	0	1	1	1	3.32	0	1	0	1	1	1	1	1	6	0		1	1	1	0	0	1	
Particle size clay	1		1	1	1	0			1		0	0	0		1	1	2		0	0	0	1	1		0	2		
Particle size sand	1		1	1	1	0			9.5		0	0	0		1	1	2		0	0	0	1	1		0	0		
Particle size silt	1		1	1	1	0			0		0	0	0		1	1	2		0	0	0	1	1		0	2		
pH <sub>CaCl2</sub>	2.9	1	1	1	1	2.9	1	2.9	2.9	2.9	0	2.9	0	1	2.9	2.9	2.9	2.9	2.9	2.9	0	1	2.9	2.9	2.9	2.9	1	
pH <sub>H2O</sub>	2.7	1	1	1	1	2.7	1	2.7	2.7	2.7	0	2.7	0	1	2.7	1	2.7	1	2.7	2.7	2.7	0	1	2.7	2.7	2.9	2.7	0
Reactive Al	2.6	2.6	2.6	2.6	2.2	2.6		2.6	2.6				2.6	2.6	2.6	2.6		2.6	2.6	2.6	2.6	2.6	2.6		0		2.6	
Reactive Fe	2.6	2.6	2.6	2.6	2.2	2.6		2.6	2.6				2.6	2.6	2.6	2.6		2.6	2.6	2.6	2.6	2.6	2.6		0		2.6	
Total Al	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total Ca	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total Fe	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total K	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total Mg	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total Mn	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			
Total N	1	1	1	1	3.52	0	1	0	1	3.5	0	1	3.51	1	1	1	1	3.51	6	3.51		1	1	1	0	1	1	
Total Na	4.2		4.2					4.2	4.2					4.2		5.2			5.2			2.4			4.2			

PARAMETER	55	56	58	59	60	61	62	63	64	67	68	69	71	77	79	80	81	82	83	84	85	
CaCO <sub>3</sub>		1		1	1	0	0	1	0	0	6	0	1		0		0	1		0	1	
Exchangeable Acidity	2.11	2.11		2.11	2.1			2.1	2.1	2.1	0		2.1				0		1	2.11		
Exchangeable Al	2.11	2.11	0	2.11	2.1			2.1	2.1	2.1	2.1		2.1				0	2.1	1	2.11	2.1	
Exchangeable Ca	2.11	2.11	0	2.11	2.1			2.1	2.1	2.1	2.1		2.1	2.1			0	2.1	1	2.11	2.1	
Exchangeable Fe	2.11	2.11	0	2.11	2.1			2.1	2.1	2.1	2.1		2.1	2.1			0	2.1	1	2.11	2.1	
Exchangeable K	2.11	2.11	0	2.11	2.1		0	2.1	2.1	2.1	2.1		2.1	2.1			0	2.1	1	2.11	2.1	
Exchangeable Mg	2.11	2.11	0	2.11	2.1			2.1	2.1	2.1	2.1		2.1	2.1			0	2.1	1	2.11	2.1	
Exchangeable Mn	2.11	2.11	0	2.11	2.1			2.1	2.1	2.1	2.1		2.1	2.1			0	2.1	1	2.11	2.1	
Exchangeable Na	2.11	2.11	0	2.11			0	2.1	2.1	2.1	2.1		2.1	2.1			0	2.1		2.11	2.1	
Extractable Al	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3					0	2.3	1	2.3		
Extractable Ca	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3		2.3			0	2.3	1	2.3	2.3	
Extractable Cd	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3	2.3	
Extractable Cr	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3		
Extractable Cu	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3	2.3	
Extractable Fe	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3		2.3			0	2.3	1	2.3		
Extractable Hg					2.3	0		5.8	2.3	2.3	2.3	2.3	2.3				0				1	
Extractable K	5.8	3.11		2.3		2.3		5.8	2.3	2.3	2.3	2.3		2.3			0	2.3	1	2.3	2.3	
Extractable Mg	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3		2.3			0	2.3	1	2.3	2.3	
Extractable Mn	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3	2.3	
Extractable Na	5.8	3.11		2.3		2.3			2.3	2.3	2.3	2.3		2.3			0	2.3		2.3		
Extractable Ni	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3		
Extractable P	5.8	3.11		2.3	2.3	2.3	0	5.8	2.3	2.3	2.3	2.3					0		1	2.3	2.3	
Extractable Pb	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3	2.3	
Extractable S	5.8			1		2.3		5.8	2.3			2.3		2.3			0				2.3	
Extractable Zn	5.8	3.11		2.3	2.3	2.3		5.8	2.3	2.3	2.3	2.3	2.3	2.3			0	2.3	1	2.3	2.3	
Free H	2.11	2.11		2.11				2.1	2.1	2.1	2.1		2.1				0				2.11	
Moisture	0	1	0	1	1	0		0	0	0	1		1	1	1		0	1	1	1	0	
OC		1		1	3.32	0	0	1	0	0	0	1	1		0		0	1	1	7	1	
Particle size clay	0	1	0	1	1	0		0	3.31	0		1	1		0	0	0	1			1	
Particle size sand	0	1	0	0	1	0		0	3.31	0		1	1		0	0	0	1			1	
Particle size silt	0	1	0	0	1	0		0	3.31	0		1	1		0	0	0	1			1	
pH <sub>CaCl2</sub>	0	1	0	2.9	1	2.9	0	2.9	2.9	2.9	1	2.9	2.9	2.9	1		0	2.9	1	2.9	2.9	
pH <sub>H2O</sub>	0	1		2	1	2.7	0	2	2.7	2.7	1	2.7	2.7	2.7	1		0	2.7	1	2.7	2.7	
Reactive Al	2.6	2.6				2.6			2.6	2.6	0									1	2.6	
Reactive Fe	2.6	2.6				2.6			2.6	2.6	0									1	2.6	
Total Al																				2.4	2.4	
Total Ca																				2.4	2.4	
Total Fe																				2.4	2.4	
Total K																				2.4	2.4	
Total Mg																				2.4	2.4	
Total Mn																				2.4	2.4	
Total N	0	1		1	1	0	3.51	0	0		0	1	3.52		0		0		3.51		7	3.5
Total Na																				2.4	2.4	

**Table 3.4: Reported methods for determination**

PARAMETER	3	6	7	8	10	11	12	13	14	18	21	23	26	30	31	32	34	35	36	37	38	40	42	45	48	53	54	
CaCO <sub>3</sub>	15	15	83	83	0		83	83	83		82	83	83	13	13	83	90	13	70	73	83	83	83		13	83		
Exchangeable Acidity	91		72	91	82	73		91	31		82		82	91	72	91	82	73	91	82	82	82	82	72	0		82	
Exchangeable Al	31	31	31	31	31	31		31	31		31	31	31	31	31	31	31	31	31	31	21	31	21	21	31		31	
Exchangeable Ca	31	31	31	31	31	31	21	31	31		31	21	31	31	31	31	31	31	31	31	21	31	21	21	31		31	
Exchangeable Fe	31	32	31	31	31	31	21	31	31		31	21	31	31	31	31	31	31	31	31	21	31	21	21	31		31	
Exchangeable K	31	31	31	31	31	31	21	21	31		31		31	31	31	31	31	31	31	31	31	21	31	28	21	31	31	
Exchangeable Mg	31	31	31	31	31	31	21	31	31		31	21	31	31	31	31	31	31	31	31	21	31	21	21	31		31	
Exchangeable Mn	31	32	31	31	31	31	21	31	31		31	21	31	31	31	31	31		31	31	21	31	21	21	31		31	
Exchangeable Na	31	31	31	31	31	31	21	21	31		31		31	31	31	31	21	31	31	31	21	21	21	21	31		31	
Extractable Al	31	31	31	31	31	31		31	31			31	31	31	31	31	31	31	31	31		31		21	31		31	
Extractable Ca	31	31	31	31	31	31	21	31	31			31	31	31	31	31	31	31	31	31		31		21	31		31	
Extractable Cd	22	31	31	31	31	31	21	31	22	21			31	31	31	35	35	22	31	22	31		31	21	31	31	31	
Extractable Cr	32	31	31	31	31	31		31	21	21			31	31	31	31	35	31	31	31	31		31		31	31	31	
Extractable Cu	32	31	31	31	31	31	21	31	21	21			31	31	31	35	35	21	31	31	31		31	21	31	31	31	
Extractable Fe	31	31	31	31	31	31	21	31	31			31	31	31	31	31	31	31	31	31	31		31		21	31	31	
Extractable Hg		31							25			25			25		20	25	26				26			0		
Extractable K	31	31	31	31	31	31	21	31	31			31	31	31	31	31	31	31	31	31		21	28	21	31	50	31	
Extractable Mg	31	31	31	31	31	31	21	31	31			31	31	31	31	31	31	31	31	31		31		21	31		31	
Extractable Mn	31	31	31	31	31	31	21	31	31			31	31	31	31	31	31	31	31	31		31	21	21	31		31	
Extractable Na	31	31	31		31	31	21	31	31			31	31	31	31	31	31	31	31	31		31		21	31		31	
Extractable Ni	32	31	31	31	31	31	21	31	21	21		31	31	31	31	35	21	31	31	31		31		31	31		31	
Extractable P	31	31	31	31	31	31		31	31	50		31	31	31	31	31	31	31	31	31		31		31	31	50	31	
Extractable Pb	32	31	31	31	31	31	21	31	21	21		31	31	31	35	35	21	31	31	31		31	21	31	31		31	
Extractable S	31	31	31	31	31	31		31	31				31	31	31	31	14		31	31		31			31		31	
Extractable Zn	31	31	31	31	31	31	21	31	21	21		31	31	31	31	31	31	31	31	31		31	21	31	31		31	
Free H	91			72	82			91	72		82		82	91	72	91	72	73	91	82	82	82	82	82	0		82	
Moisture	81	1	81	81	0	0		81	81		0	81	0	81	81	81	91		81	81	0	80	81	91	0	90	81	
OC	15	15	17	15	13	17	17	15	15	50	12	17	13	15	13	15	17	13	15	13		13	15	17	13	91	13	
Particle size clay	90		83	81	81	0			81		81	81	81		81	81	81		81	81	81	81	90		0	81		
Particle size sand	90		83	81	0	0			81		81	90	81		81	81	81		81	81	0	81	90		0	81		
Particle size silt	90		83	81	81	0			81		81	81	81		81	81	81		81	81	81	81	90		0	81		
pH <sub>CaCl2</sub>	72	72	72	72	0	72	72	72	72	80	72	72	72	72	72	72	72	72	72	80	0	80	70	72	0	0	72	
pH <sub>H2O</sub>	72	72	72	72	0	72	72	72	72	80	72	72	72	72	72	72	72	72	72	80	0	80	70	72	0	80	72	
Reactive Al	31	31	31	31	31	31		31	31				31	31	31	31		31	31	31	21	31			31		31	
Reactive Fe	31	31	31	31	31	31		31	31				31	31	31	31		31	31	31	21	31			31		31	
Total Al	31		31					31	31					31		31			31				31			31		
Total Ca	31		31					31	31					31		31			31				31			31		
Total Fe	31		31					31	31					31		31			31				31			31		
Total K	31		31					31	31					31		31			31				31			31		
Total Mg	31		31					31	31					31		31			31				31			31		
Total Mn	31		31					31	31					31		31			31				31			31		
Total N	15	15	17	15	82	17	17	15	15	82	12	17	11	15	12	15	17	11	15	11		12	15	17	15	12	12	
Total Na	31		31					31	31					31		31			31				31			31		

PARAMETER	55	56	58	59	60	61	62	63	64	67	68	69	71	77	79	80	81	82	83	84	85
CaCO <sub>3</sub>		90		83	73	84	0	83	83	13	13	83	83		91		0	83		91	83
Exchangeable Acidity	82	31		91	72			82	82	91	91		73				0		82	82	
Exchangeable Al	31	31	21	21	31			31	31	31	31		21				0	21	21	31	31
Exchangeable Ca	31	31	21	21	31			31	31	31	31		21	21			0	21	21	31	31
Exchangeable Fe	31	31	21	21	31			31	31	31	31		21	21			0	21	21	31	31
Exchangeable K	31	31	21	21	31		0	31	31	31	31		21	21			0	28	21	31	31
Exchangeable Mg	31	31	21	21	31			31	31	31	31		21	21			0	21	21	31	31
Exchangeable Mn	31	31	21	21	31			31	31	31	31		21	21			0	21	21	31	31
Exchangeable Na	31	31	21	21			0	31	31	31	31		21	21			0	28		31	31
Extractable Al	31	31		21	31	31		31	31	31	31	31					0	21	21	31	
Extractable Ca	31	31		21	31	31		31	31	31	31	31		21			0	21	21	31	31
Extractable Cd	31	31		22	31	35		31	31	35	21	35	21	21			0	21	21	31	31
Extractable Cr	31	31		21	31	35		31	31	31	31	35	21	21			0	21	21	31	
Extractable Cu	31	31		21	31	35		31	31	31	31	35	21	21			0	21	21	31	31
Extractable Fe	31	31		21	31	31		31	31	31	31	31		21			0	21	21	31	
Extractable Hg					90	0		25	25	25	25	24	25				0				22
Extractable K	31	31		21		31		28	31	31	31	31		21			0	28	21	31	31
Extractable Mg	31	31		21	31	31		31	31	31	31	31		21			0	21	21	31	31
Extractable Mn	31	31		21	31	31		31	31	31	31	35	21	21			0	21	21	31	31
Extractable Na	31	31		21		31		31	31	31	35		21				0	28		31	
Extractable Ni	31	31		21	31	35		31	31	31	31	35	21	21			0	21	21	31	
Extractable P	31	31		51	31	31	0	31	53	31	31	31					0		50	31	31
Extractable Pb	31	31		22	31	35		31	31	35	21	35	21	21			0	21	21	31	31
Extractable S	31			17		31		31	17			31		52			0			31	
Extractable Zn	31	31		21	31	31		31	31	31	31	35	21	21			0	21	21	31	31
Free H	91	31		72				82	82	70	72		73				0				82
Moisture	81	90	81	81	90	0		81	0	81	81		81	81	0		0	90	91	91	0
OC		17		91	84	17	0	13	13	13	13	15	13		15		0	84	84	17	84
Particle size clay	81	81	0	81	81	0		81	81	0		81	81		0	0	0	81			81
Particle size sand	81	90	0	81	81	0		81	81	0		81	81		0	0	0	81			81
Particle size silt	81	91	0	0	81	0		82	81	0		81	81		0	0	0	81			81
pH <sub>CaCl2</sub>	72	70	72	72	72	0	0	72	70	70	72	70	72	72	0		0	72	72	72	72
pH <sub>H2O</sub>	72	70		72	72	0	0	72	70	70	72	70	72	72	0		0	72	72	72	72
Reactive Al	31	31				31			31	31	31									21	31
Reactive Fe	31	31				31			31	31	31									21	31
Total Al																			21		31
Total Ca																			21		31
Total Fe																			21		31
Total K																			28		31
Total Mg																			21		31
Total Mn																			21		31
Total N	18	17		17	15	17	11	11	13		12	15	11		15		0	11		17	11
Total Na																			28		31

**Annex 4: Splus output of the in depth statistical analysis**

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
0	Moisture	A	k32;h42;k21;k82;k61;k55;k79	5	105	35	3	0.92	0.19	0.37	1.16	100.14	0.00	0.03	0.18	0.19	20.33	97.06
0	Moisture	B	hk42;k60;k82	2	117	39	3	0.72	0.16	0.30	1.00	62.52	0.00	0.04	0.16	0.16	22.57	95.35
0	Moisture	C	h11;k77;k82	3	117	39	3	1.74	0.29	0.83	2.27	42.90	0.00	0.08	0.29	0.30	17.08	93.32
0	Moisture	D	h11;k21;k82	3	117	39	3	1.18	0.19	0.67	1.77	61.11	0.00	0.04	0.19	0.19	16.42	95.25
0	Moisture	E	k82;k60;k61	4	114	38	3	7.51	3.08	0.80	13.43	1129.79	0.00	0.16	3.07	3.08	40.96	99.73
1	Particle size clay	A	h34	2	99	33	3	5.20	1.72	1.38	8.97	31.05	0.00	0.54	1.70	1.78	34.22	90.92
1	Particle size clay	B	h34;k59;k60	2	93	31	3	9.56	1.91	6.12	14.69	58.33	0.00	0.43	1.90	1.94	20.33	95.03
1	Particle size clay	C	k82;k37;k60	4	93	31	3	22.62	6.39	5.88	37.15	145.10	0.00	0.92	6.37	6.43	28.45	97.96
1	Particle size clay	D	k59;k11	3	96	32	3	26.01	3.66	15.98	35.86	99.67	0.00	0.63	3.64	3.69	14.20	97.05
1	Particle size sand	A	h34;k53;k60	3	93	31	3	84.71	4.12	72.97	92.98	74.94	0.00	0.82	4.09	4.18	4.93	96.10
1	Particle size sand	B	k85;k59	3	96	32	3	45.68	14.05	10.83	80.23	450.15	0.00	1.15	14.04	14.08	30.83	99.34
1	Particle size sand	C		1	102	34	3	43.64	8.45	17.05	65.01	79.87	0.00	1.64	8.40	8.55	19.60	96.34
1	Particle size sand	D	k60;h38;k85	3	93	31	3	37.02	6.06	24.60	53.01	150.88	0.00	0.85	6.04	6.10	16.48	98.04
1	Particle size silt	A		1	102	34	3	10.47	3.91	4.53	21.67	67.80	0.00	0.82	3.88	3.97	37.89	95.70
1	Particle size silt	B	k85	2	99	33	3	43.84	12.49	10.93	64.04	218.05	0.00	1.46	12.46	12.54	28.62	98.64
1	Particle size silt	C	k85;k60;k23	4	93	31	3	34.26	7.88	21.73	56.46	181.67	0.00	1.01	7.86	7.92	23.13	98.37
1	Particle size silt	D	k60;h55;k85;h38	4	90	30	3	37.12	4.92	25.71	48.63	74.69	0.00	0.99	4.89	4.99	13.43	96.09
2	pHCaCl2	A	k42;k82	2	135	45	3	4.15	0.10	3.87	4.47	44.40	0.00	0.03	0.10	0.10	2.48	93.53
2	pHCaCl2	B	k62;k63;k26;k82;k83;k42	5	123	41	3	3.83	0.09	3.57	4.10	176.78	0.00	0.01	0.09	0.09	2.35	98.32
2	pHCaCl2	C	k62;k67;k36;k42	4	129	43	3	7.32	0.20	6.89	7.74	84.44	0.00	0.04	0.20	0.20	2.72	96.53
2	pHCaCl2	D	k62;h71k;k42	3	132	44	3	4.00	0.08	3.79	4.20	43.43	0.00	0.02	0.08	0.08	2.04	93.40
2	pHCaCl2	E	h18;k62;k63;k21;k40;k61;k81;k42;h85;k48	7	111	37	3	2.84	0.06	2.68	3.00	188.06	0.00	0.01	0.06	0.06	2.29	98.42
2	pHH2O	A	k42;k62;h71	2	129	43	3	4.62	0.15	4.23	5.05	64.74	0.00	0.03	0.15	0.16	3.40	95.51
2	pHH2O	B	k62;k63	3	132	44	3	4.22	0.14	3.90	4.70	94.38	0.00	0.03	0.14	0.15	3.45	96.89
2	pHH2O	C	k62	2	135	45	3	7.88	0.26	7.09	8.33	100.74	0.00	0.05	0.26	0.27	3.37	97.08
2	pHH2O	D	h71	2	135	45	3	4.57	0.17	4.09	5.01	39.83	0.00	0.05	0.17	0.18	3.89	92.83
2	pHH2O	E	h85	2	135	45	3	4.00	0.23	3.37	4.41	51.72	0.00	0.05	0.22	0.23	5.75	94.42
3	CaCO3	C		1	117	39	3	148.42	67.05	14.10	216.37	521.71	0.00	5.08	66.99	67.18	45.26	99.43
4	OC	A	hk42;hk81;h83k;k61	4	114	38	3	7.97	1.12	5.33	10.40	29.81	0.00	0.36	1.11	1.16	14.57	90.57
4	OC	B	hk81	2	123	41	3	6.71	1.13	4.43	10.40	35.56	0.00	0.33	1.12	1.16	17.34	92.01
4	OC	C	h81	2	120	40	3	27.89	7.95	3.93	51.63	184.47	0.00	1.01	7.93	8.00	28.67	98.39
4	OC	D	hk60;hk81;hk63;k82;k8;h83;h53;k18;k31	7	96	32	3	3.83	0.35	3.09	4.77	17.80	0.00	0.14	0.34	0.37	9.58	84.85
4	OC	E	k35;hk85;h81	3	114	38	3	497.39	37.30	403.60	566.67	182.47	0.00	4.78	37.20	37.50	7.54	98.37

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
5	Total N	A	k42;k55;hk81;k82	2	117	39	3	0.49	0.10	0.34	0.80	29.83	0.00	0.03	0.10	0.11	21.89	90.57
5	Total N	B		1	126	42	3	0.44	0.12	0.10	0.70	61.13	0.00	0.03	0.12	0.12	26.99	95.25
5	Total N	C	hk82;hk12;h53;k55;h64;h59	6	111	37	3	2.41	0.10	2.20	2.60	7.37	0.00	0.06	0.09	0.11	4.72	68.00
5	Total N	D		1	129	43	3	0.70	0.15	0.30	1.03	37.94	0.00	0.04	0.15	0.15	21.84	92.49
5	Total N	E	k62	2	126	42	3	9.59	0.97	7.30	12.77	101.24	0.00	0.17	0.97	0.98	10.23	97.09
6	Exchangeable Acidity	A	k81	2	96	32	3	1.43	0.56	0.03	2.55	162.89	0.00	0.08	0.56	0.57	39.74	98.18
6	Exchangeable Acidity	B	h32;k71;k42;h7	3	87	29	3	3.23	0.52	1.89	4.34	84.83	0.00	0.10	0.51	0.52	16.12	96.55
6	Exchangeable Acidity	C	hk67;k26;h81;k59	4	24	8	3	0.12	0.10	0.00	0.32	309.76	0.00	0.01	0.10	0.10	81.05	99.04
6	Exchangeable Acidity	D	k56	2	96	32	3	1.88	0.56	0.09	2.88	128.49	0.00	0.09	0.56	0.57	30.00	97.70
6	Exchangeable Acidity	E	hk56;k67;k71;k63;k64	6	78	26	3	6.93	2.97	2.24	14.13	1755.16	0.00	0.12	2.97	2.97	42.90	99.83
6	Exchangeable Al	A	k85	2	114	38	3	1.15	0.40	0.20	2.46	172.93	0.00	0.05	0.40	0.40	34.95	98.29
6	Exchangeable Al	B	k42;k35;k85	4	108	36	3	2.70	0.72	0.63	3.85	242.31	0.00	0.08	0.72	0.72	26.68	98.77
6	Exchangeable Al	C	h81	2	42	14	3	0.05	0.05	0.00	0.13	100.33	0.00	0.01	0.04	0.05	90.77	97.07
6	Exchangeable Al	D	k82	2	114	38	3	1.53	0.45	0.41	2.11	172.96	0.00	0.06	0.44	0.45	29.22	98.29
6	Exchangeable Al	E	hk30;k14	3	102	34	3	0.72	0.26	0.27	1.11	82.07	0.00	0.05	0.26	0.27	37.19	96.43
6	Exchangeable Ca	A	hk77;hk38;k59h;hk42;hk64;k67;hk84;h81;k82;h12	7	78	26	3	0.06	0.04	0.02	0.15	76.21	0.00	0.01	0.04	0.04	62.59	96.16
6	Exchangeable Ca	B	hk77;h38;k59;hk42;hk84;h64;k67;k7;h81;k82	6	84	28	3	0.12	0.05	0.05	0.26	63.43	0.00	0.01	0.05	0.05	38.55	95.41
6	Exchangeable Ca	C	hk77;k85;k59;k71;k82;k14	6	102	34	3	17.38	3.15	8.72	25.93	355.21	0.00	0.29	3.15	3.16	18.18	99.16
6	Exchangeable Ca	D	hk77;k85h;hk12;hk38;hk42;k82;h84;k14;k63h;hk64;k67;h81	6	84	28	3	0.12	0.05	0.02	0.25	103.03	0.00	0.01	0.05	0.05	39.38	97.14
6	Exchangeable Ca	E	hk77;k71;k14	4	108	36	3	4.06	1.43	1.57	8.50	261.47	0.00	0.15	1.43	1.44	35.42	98.86
6	Exchangeable Fe	A	hk77;hk81;hk82;h12;k63;hk26;h60	6	81	27	3	0.02	0.01	0.00	0.05	21.68	0.00	0.00	0.01	0.01	64.29	87.33
6	Exchangeable Fe	B	hk77;k71;h81;hk82;k85	3	102	34	3	0.11	0.03	0.04	0.19	81.51	0.00	0.01	0.03	0.03	29.50	96.41
6	Exchangeable Fe	C	hk77;h81;hk82	3	48	16	3	0.01	0.01	0.00	0.03	52.70	0.00	0.00	0.01	0.01	89.27	94.52
6	Exchangeable Fe	D	hk77;h81;hk82;k35	4	54	18	3	0.01	0.01	0.00	0.05	62.13	0.00	0.00	0.01	0.01	103.11	95.32
6	Exchangeable Fe	E	hk77;k71;k85	4	102	34	3	0.21	0.10	0.06	0.51	509.34	0.00	0.01	0.10	0.10	47.08	99.41
6	Exchangeable K	A	hk62;hk77;k34;h82;h64;h81	5	93	31	3	0.03	0.01	0.01	0.06	67.10	0.00	0.00	0.01	0.01	48.67	95.66
6	Exchangeable K	B	hk62;hk77;h82;k85h;h64;k71;k42	5	99	33	3	0.07	0.02	0.03	0.14	72.06	0.00	0.00	0.02	0.02	33.27	95.95
6	Exchangeable K	C	hk77;k85;k63;hk62;hk82;k34;h64;k71	7	96	32	3	0.69	0.20	0.06	1.19	165.43	0.00	0.03	0.20	0.20	29.18	98.21
6	Exchangeable K	D	hk77;hk62;hk82;h64;k71	4	105	35	3	0.20	0.06	0.03	0.38	78.96	0.00	0.01	0.06	0.06	31.47	96.29
6	Exchangeable K	E	hk77;hk82;h62;k85	3	102	34	3	0.21	0.07	0.09	0.45	69.17	0.00	0.02	0.07	0.07	34.74	95.78

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
6	Exchangeable Mg	A	hk77;k67;k82;hk84;hk81;h64;h38	6	96	32	3	0.03	0.02	0.01	0.08	32.49	0.00	0.00	0.02	0.02	58.42	91.30
6	Exchangeable Mg	B	hk12;hk77;k67;h84;hk14;k35;hk81;h64;h38	6	93	31	3	0.05	0.02	0.03	0.10	64.39	0.00	0.00	0.02	0.02	34.04	95.48
6	Exchangeable Mg	C	hk77;h10;k85;k71	4	105	35	3	0.87	0.11	0.56	1.06	81.80	0.00	0.02	0.11	0.11	12.57	96.42
6	Exchangeable Mg	D	hk77;k42;hk81;k34;h84	4	105	35	3	0.12	0.04	0.08	0.21	46.34	0.00	0.01	0.04	0.04	31.82	93.79
6	Exchangeable Mg	E	hk77;k71;k85;k14;k23;k30;k59;k67	7	93	31	3	3.11	0.95	1.24	4.55	910.09	0.00	0.05	0.95	0.95	30.45	99.67
6	Exchangeable Mn	A	hk77;h11;k85	3	105	35	3	0.05	0.01	0.02	0.08	26.19	0.00	0.00	0.01	0.01	29.15	89.36
6	Exchangeable Mn	B	hk77;k42	3	105	35	3	0.03	0.01	0.01	0.05	33.03	0.00	0.00	0.01	0.01	27.61	91.44
6	Exchangeable Mn	C	hk77;hk11;hk12;h81	4	57	19	3	0.00	0.00	0.00	0.01	641.82	0.00	0.00	0.00	0.00	85.20	99.53
6	Exchangeable Mn	D	hk77;k85;k71	4	111	37	3	0.19	0.05	0.05	0.29	100.77	0.00	0.01	0.05	0.05	25.65	97.08
6	Exchangeable Mn	E	hk77;k56;k68	3	99	33	3	0.05	0.02	0.02	0.08	139.41	0.00	0.00	0.02	0.02	36.58	97.88
6	Exchangeable Na	A	hk77;k67;hk82;hk64;h81;k62;h84;k26;h6;k71	7	51	17	3	0.02	0.02	0.01	0.07	100.72	0.00	0.00	0.02	0.02	88.71	97.08
6	Exchangeable Na	B	hk77;hk64;hk82;hk62;k67;h81;hk85;k42;h84;h6	7	72	24	3	0.04	0.02	0.02	0.10	60.40	0.00	0.00	0.02	0.02	53.30	95.19
6	Exchangeable Na	C	hk77;k67;hk82;hk84;k26;hk64;hk81;h10;k63;k71	7	66	22	3	0.04	0.03	0.01	0.15	675.23	0.00	0.00	0.03	0.03	93.16	99.56
6	Exchangeable Na	D	hk77;hk82;hk85;hk64;k67;k62h;hk81;k71;h84;h6	7	69	23	3	0.02	0.01	0.01	0.07	60.05	0.00	0.00	0.01	0.02	65.91	95.16
6	Exchangeable Na	E	hk77;hk64;h82;h62;k67;k11;hk8;k13;k35	7	78	26	3	0.27	0.10	0.06	0.45	193.20	0.00	0.01	0.10	0.10	38.27	98.46
6	Free H	A	hk71;k26h;hk55;hk63;hk38;k84h;k59;hk81;k64	7	39	13	3	0.05	0.04	0.01	0.16	1043.55	0.00	0.00	0.04	0.04	84.24	99.71
6	Free H	B	h55	2	69	23	3	0.23	0.21	0.01	0.81	186.84	0.00	0.03	0.20	0.21	91.14	98.41
6	Free H	C	hk26;54hk;h64	4	15	5	3	0.06	0.04	0.02	0.12	54.75	0.00	0.01	0.04	0.04	61.71	94.71
6	Free H	D	hk63;h55;k81h;k59;k71	5	51	17	3	0.10	0.07	0.01	0.27	135.60	0.00	0.01	0.07	0.07	67.29	97.82
6	Free H	E	hk63;k56	3	75	25	3	5.61	3.05	0.00	13.76	495.06	0.00	0.24	3.05	3.06	54.52	99.40

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
7	Extractable Al	A	k55;h81;k35;k54;k37	4	90	30	3	14568.0	2150.9	9681.9	18220.0	89.59	0.00	393.6	2138.9	2174.8	14.93	96.72
7	Extractable Al	B	k55;h81;k82;k64	4	93	31	3	8828.0	1183.4	5446.2	12071.7	77.92	0.00	232.2	1175.8	1198.5	13.58	96.25
7	Extractable Al	C	k64;h81;k37;k55;k54;k60;k82	7	84	28	3	18281.3	3192.0	10435.3	25466.7	88.28	0.00	588.4	3173.9	3228.0	17.66	96.68
7	Extractable Al	D	k23;k54;hk55;h81;hk37;k60;k82;k59	7	81	27	3	25762.7	3818.1	14427.9	33283.0	151.56	0.00	537.2	3805.4	3843.2	14.92	98.05
7	Extractable Al	E	hk81	2	96	32	3	367.5	93.6	108.9	610.3	72.9	0.00	19.0	92.9	94.9	25.81	95.99
7	Extractable Ca	A	k59;k35;k54;k55;k37;k23;k60	6	93	31	3	1699.1	677.4	29.1	2730.1	297.9	0.00	68.0	676.3	679.7	40.00	99.00
7	Extractable Ca	B	hk12;k55;hk82	3	102	34	3	350.7	155.9	10.4	829.8	111.0	0.00	25.6	155.2	157.3	44.86	97.34
7	Extractable Ca	C	h61;k64;h81;h83;h77	5	99	33	3	76073.9	6211.0	61699.5	92709.7	38.9	0.00	1725.7	6130.6	6368.8	8.37	92.66
7	Extractable Ca	D	hk12;k35;k55h;h64	3	99	33	3	162.3	77.6	7.4	390.0	131.0	0.00	11.7	77.3	78.2	48.15	97.74
7	Extractable Ca	E	hk82;h77;h81;h11;h64	6	96	32	3	1081.3	129.4	883.3	1422.7	40.4	0.00	35.3	127.8	132.5	12.26	92.93
7	Extractable Cd	A	hk55;hk56;hk10;hk6;hk3	3	63	21	3	0.11	0.05	0.03	0.23	157.23	0.00	0.01	0.05	0.05	48.68	98.12
7	Extractable Cd	B	hk56;hk12;hk63;hk10;k77;hk55;h6;k48	7	45	15	3	0.05	0.03	0.02	0.10	100.06	0.00	0.00	0.03	0.03	57.11	97.06
7	Extractable Cd	C	hk56;hk63;hk6;hk84;k11;h12k;hk10	7	63	21	3	0.16	0.06	0.04	0.29	48.52	0.00	0.01	0.06	0.06	35.80	94.06
7	Extractable Cd	D	hk55;hk56;hk12;hk63;hk6;hk10;k11;k48;h84;k59	7	54	18	3	0.12	0.05	0.02	0.20	101.29	0.00	0.01	0.05	0.05	44.58	97.10
7	Extractable Cd	E	hk12;hk55;k10;k42;h68;k59;k3	6	66	22	3	0.19	0.05	0.12	0.30	63.04	0.00	0.01	0.05	0.05	24.85	95.39
7	Extractable Cr	A		1	114	38	3	24.61	5.60	12.50	36.33	41.57	0.00	1.50	5.53	5.73	23.29	93.12
7	Extractable Cr	B	k56h	2	111	37	3	20.71	3.84	12.27	32.23	67.22	0.00	0.81	3.82	3.90	18.83	95.67
7	Extractable Cr	C	k64	2	111	37	3	24.15	5.94	12.70	43.67	91.15	0.00	1.08	5.91	6.01	24.88	96.78
7	Extractable Cr	D	k55h;k56;h60;k54	3	102	34	3	37.22	10.09	15.00	62.87	260.36	0.00	1.08	10.07	10.13	27.22	98.86
7	Extractable Cr	E	hk81;k82	3	72	24	3	1.42	0.88	0.47	4.03	75.86	0.00	0.17	0.87	0.89	62.88	96.15
7	Extractable Cu	A	hk56;h81;k82;h11	4	111	37	3	11.59	1.09	8.63	13.70	17.10	0.00	0.46	1.06	1.15	9.92	84.29
7	Extractable Cu	B	hk56;hk82;k32;h81	4	111	37	3	4.49	0.61	3.28	5.97	22.70	0.00	0.22	0.59	0.63	14.10	87.86
7	Extractable Cu	C	hk56;hk82;k55;k8;h81;h12;k32	4	102	34	3	13.24	1.45	9.63	17.47	20.94	0.00	0.55	1.41	1.52	11.45	86.92
7	Extractable Cu	D	hk60;hk56;hk12;hk82;k32;h81	5	105	35	3	12.30	1.73	8.73	17.97	33.65	0.00	0.52	1.70	1.78	14.44	91.58
7	Extractable Cu	E	hk32;hk82;k40;k42;k48	4	90	30	3	1.79	0.86	0.13	3.94	132.04	0.00	0.13	0.85	0.86	48.18	97.76
7	Extractable Fe	A	k63;h83;k60;h77;h81	4	96	32	3	21360.7	2780.5	12919.0	25311.3	63.0	0.0	606.9	2758.3	2824.3	13.22	95.38
7	Extractable Fe	B	48k;h83;h77;h81;h12	5	96	32	3	11709.2	954.2	9433.3	14089.7	60.7	0.0	212.2	946.3	969.8	8.28	95.21
7	Extractable Fe	C	k35;h83;h77;h81	4	99	33	3	20966.1	3004.5	11262.3	26607.0	34.1	0.0	891.0	2960.1	3091.3	14.74	91.69
7	Extractable Fe	D	k6;k23;k64;k63k	5	99	33	3	29367.1	9745.5	685.5	40378.7	709.1	0.0	633.9	9738.6	9759.2	33.23	99.58
7	Extractable Fe	E	h10;hk12;hk82;k63	3	96	32	3	397.8	82.5	145.7	585.3	85.7	0.0	15.4	82.0	83.5	20.99	96.58

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
7	Extractable Hg	A	hk48;hk64;h67	3	36	12	3	0.02	0.01	0.01	0.03	14.18	0.00	0.00	0.01	0.01	30.37	81.46
7	Extractable Hg	B	hk6;hk48;hk67	3	42	14	3	0.03	0.01	0.02	0.04	15.84	0.00	0.00	0.01	0.01	22.72	83.18
7	Extractable Hg	C	hk6;hk48;hk64;h67;k63;k23	6	33	11	3	0.03	0.01	0.00	0.04	240.44	0.00	0.00	0.01	0.01	40.15	98.76
7	Extractable Hg	D	hk6;hk48;hk67;hk64	4	36	12	3	0.02	0.00	0.02	0.03	80.78	0.00	0.00	0.00	0.00	15.96	96.38
7	Extractable Hg	E	hk64;hk48;k68;k35;k67	6	30	10	3	0.04	0.01	0.03	0.05	655.49	0.00	0.00	0.01	0.01	17.01	99.54
7	Extractable K	A	hk55;k35;k37;k23;k12	5	96	32	3	1479.1	638.4	20.0	3251.5	415.5	0.0	54.2	637.6	639.9	43.27	99.28
7	Extractable K	B	h53;k55;k37	3	105	35	3	1581.2	344.7	956.5	2682.0	99.9	0.0	59.7	343.0	348.2	22.02	97.06
7	Extractable K	C	k37;k55;k64	3	102	34	3	4809.4	1743.3	402.1	9343.7	270.4	0.0	183.6	1740.1	1749.7	36.38	98.90
7	Extractable K	D	hk55;k35;h37	3	102	34	3	2414.0	1081.8	102.2	5654.4	213.8	0.0	128.2	1079.3	1086.9	45.02	98.61
7	Extractable K	E	hk12;h82;h55;k32h	5	96	32	3	114.1	25.5	45.5	177.9	36.8	0.0	7.3	25.1	26.1	22.90	92.27
7	Extractable Mg	A	hk64;h10;k60;k82;h83;k84;h81;h77	6	90	30	3	3414.3	347.6	2440.0	3942.6	46.7	0.0	88.1	343.9	355.0	10.40	93.85
7	Extractable Mg	B	h10;k82;h83;hk85;60k;h81;h56	5	93	31	3	1346.0	93.4	1103.3	1491.7	44.2	0.0	24.3	92.3	95.5	7.09	93.50
7	Extractable Mg	C	h10;h83	3	108	36	3	3028.4	419.7	1637.7	3605.9	49.0	0.0	103.9	415.3	428.1	14.14	94.11
7	Extractable Mg	D	k60;k82	3	108	36	3	4200.7	1300.4	48.6	5799.0	640.5	0.0	89.0	1299.4	1302.5	31.01	99.53
7	Extractable Mg	E	h11;k59	2	105	35	3	500.1	59.3	360.7	625.0	42.2	0.0	15.8	58.6	60.7	12.13	93.21
7	Extractable Mn	A	k82	2	114	38	3	437.9	95.8	140.8	719.4	38.0	0.0	26.9	94.5	98.2	22.43	92.50
7	Extractable Mn	B	h12;h81	3	111	37	3	109.3	13.2	72.0	128.5	24.4	0.0	4.6	12.9	13.7	12.57	88.63
7	Extractable Mn	C	k64;k56	3	111	37	3	360.3	66.9	149.8	454.2	42.7	0.0	17.7	66.1	68.5	19.00	93.28
7	Extractable Mn	D	k35;k6;h77;h81;h83	3	102	34	3	1106.4	98.5	831.0	1242.3	16.0	0.0	42.6	95.4	104.5	9.44	83.37
7	Extractable Mn	E	hk12;k48	3	111	37	3	17.75	4.46	5.07	25.08	73.66	0.00	0.90	4.43	4.52	25.49	96.03
7	Extractable Na	A	hk12;k55;k56h;35k	4	87	29	3	92.41	47.98	7.40	205.67	126.36	0.00	7.39	47.79	48.36	52.33	97.66
7	Extractable Na	B	k55;hk56;k30;h64;k32	4	84	28	3	51.80	25.90	6.00	121.33	112.51	0.00	4.23	25.78	26.13	50.44	97.38
7	Extractable Na	C	k55;k56	3	93	31	3	141.36	66.72	10.27	326.00	127.43	0.00	10.24	66.46	67.24	47.57	97.68
7	Extractable Na	D	hk55;k81;h37k;k56;k54	5	84	28	3	113.28	60.94	7.67	269.67	306.25	0.00	6.03	60.84	61.14	53.97	99.03
7	Extractable Na	E	k61h;h10	3	90	30	3	94.32	54.96	10.57	259.43	87.68	0.00	10.17	54.65	55.59	58.93	96.65
7	Extractable Ni	A	hk56;h81;k82;k12h;k10	5	102	34	3	18.73	1.79	13.10	22.03	40.45	0.00	0.49	1.77	1.83	9.78	92.93
7	Extractable Ni	B	h12k;hk56;h81;k82;k63;k71;k34	6	93	31	3	4.89	0.63	3.43	6.23	53.50	0.00	0.15	0.62	0.64	13.09	94.59
7	Extractable Ni	C	h12;hk56;hk82;h81	4	105	35	3	17.31	1.93	12.27	21.20	23.90	0.00	0.69	1.89	2.01	11.64	88.42
7	Extractable Ni	D	h12;k61;h81;k35;k56h	3	102	34	3	58.67	5.46	47.27	69.67	24.50	0.00	1.91	5.35	5.68	9.68	88.68
7	Extractable Ni	E	k10;hk12;k55;k82	4	69	23	3	1.05	0.51	0.20	2.37	62.68	0.00	0.11	0.51	0.52	49.10	95.36

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
7	Extractable P	A	h53;hk56;h62;k84	3	102	34	3	688.6	44.6	545.7	766.2	24.0	0.00	15.79	43.69	46.45	6.75	88.45
7	Extractable P	B	hk56;34k;h83;h53;h62	5	99	33	3	101.3	17.3	70.4	144.7	64.6	0.00	3.73	17.16	17.56	17.34	95.49
7	Extractable P	C	k23;h53;h62;h56	4	102	34	3	428.9	45.5	326.6	549.7	22.2	0.00	16.72	44.50	47.54	11.08	87.63
7	Extractable P	D	hk56;k34	3	108	36	3	279.9	82.9	5.6	516.3	573.0	0.00	6.00	82.80	83.02	29.67	99.48
7	Extractable P	E	k48;h83	2	105	35	3	182.3	51.6	34.7	269.3	301.2	0.00	5.15	51.55	51.81	28.42	99.01
7	Extractable Pb	A	hk56;hk82;k60	4	114	38	3	8.03	2.48	1.67	14.17	149.88	0.00	0.35	2.47	2.49	31.07	98.02
7	Extractable Pb	B	hk56;hk82;k12	4	114	38	3	7.98	1.82	2.65	11.40	70.77	0.00	0.37	1.80	1.84	23.11	95.88
7	Extractable Pb	C	k42;hk56;hk82;k6;k60;h81	4	102	34	3	13.25	2.34	8.37	19.83	69.49	0.00	0.49	2.33	2.38	17.94	95.80
7	Extractable Pb	D	hk56;hk82;hk60;h55;k6	6	108	36	3	11.51	3.05	2.33	18.33	122.72	0.00	0.48	3.03	3.07	26.69	97.59
7	Extractable Pb	E	k59h;k82;k68;h81;h11;12k	4	102	34	3	12.54	1.85	8.10	16.40	49.48	0.00	0.46	1.83	1.89	15.07	94.17
7	Extractable S	A	h77	2	78	26	3	91.35	32.31	25.12	178.10	68.43	0.00	6.76	32.07	32.78	35.88	95.74
7	Extractable S	B	k59;hk77;h10	3	72	24	3	76.99	25.17	23.77	145.67	91.97	0.00	4.55	25.03	25.44	33.04	96.81
7	Extractable S	C	hk11;h77	3	75	25	3	418.74	226.58	13.93	1017.67	616.98	0.00	15.80	226.39	226.94	54.20	99.52
7	Extractable S	D	k59;h77	2	75	25	3	131.76	38.36	24.20	182.72	67.95	0.00	8.06	38.07	38.92	29.53	95.71
7	Extractable S	E	k59;k64	2	75	25	3	1131.39	294.59	295.95	1698.43	615.71	0.00	20.56	294.35	295.07	26.08	99.51
7	Extractable Zn	A	hk82;k56;h81;k10;k63	5	108	36	3	60.39	7.07	44.33	82.67	66.41	0.00	1.50	7.01	7.17	11.88	95.61
7	Extractable Zn	B	hk82;h81	3	117	39	3	19.67	2.67	13.70	25.27	19.42	0.00	1.05	2.60	2.81	14.27	85.99
7	Extractable Zn	C	hk82;h81	3	117	39	3	37.17	5.69	23.67	48.87	35.51	0.00	1.65	5.61	5.85	15.73	92.00
7	Extractable Zn	D	hk82;k55;h81	3	114	38	3	97.29	14.01	61.27	136.93	75.57	0.00	2.79	13.92	14.20	14.59	96.13
7	Extractable Zn	E	hk82;k42;h81;h11;k55;h32k;k71;k7	6	96	32	3	21.33	2.82	12.23	26.23	53.57	0.00	0.67	2.79	2.87	13.46	94.60
8	Total Al	A	k82	2	30	10	3	47642.6	1962.2	44438.0	50343.3	20.88	0.00	743.8	1914.6	2054.0	4.31	86.89
8	Total Al	B	hk82;k84;k48	4	24	8	3	27010.0	862.5	25250.0	28123.3	41.91	0.00	230.8	852.2	882.9	3.27	93.17
8	Total Al	C	k82	2	30	10	3	42922.7	2120.7	39473.7	46956.7	27.06	0.00	706.0	2081.1	2197.6	5.12	89.68
8	Total Al	D	k84	2	30	10	3	77065.5	9097.6	58310.7	83873.3	265.42	0.00	967.2	9080.4	9131.8	11.85	98.88
8	Total Al	E	k32	2	27	9	3	666.9	135.6	473.7	893.3	45.41	0.00	34.8	134.1	138.5	20.77	93.67
8	Total Ca	A	hk82;k32	3	27	9	3	8607.7	931.4	7710.0	10451.0	64.56	0.00	200.8	924.2	945.7	10.99	95.49
8	Total Ca	B	hk82;h84k;k40	4	24	8	3	1430.6	54.0	1346.7	1505.0	17.87	0.00	22.1	52.5	57.0	3.98	84.90
8	Total Ca	C	h82	2	30	10	3	76593.8	3338.3	70803.3	81043.7	14.03	0.00	1543.9	3217.1	3568.4	4.66	81.28
8	Total Ca	D	hk82;h84	3	27	9	3	1322.2	154.7	1140.7	1575.3	13.82	0.00	72.1	149.0	165.5	12.52	81.04
8	Total Ca	E	hk32;hk84;k48;k40	5	18	6	3	1073.6	51.6	1016.7	1141.0	42.81	0.00	13.7	51.0	52.8	4.91	93.30
8	Total Fe	A	k3	2	30	10	3	28129.9	2486.6	22624.0	30570.0	136.34	0.00	368.9	2477.5	2504.8	8.90	97.83
8	Total Fe	B	k82	2	30	10	3	13468.2	558.0	12684.3	14330.0	32.13	0.00	170.5	549.2	575.1	4.27	91.21
8	Total Fe	C	k14	2	30	10	3	23571.2	1022.7	22416.7	25564.3	12.42	0.00	502.7	980.6	1102.0	4.68	79.19
8	Total Fe	D	h82	2	30	10	3	35844.7	1329.1	33578.7	37836.3	14.57	0.00	603.1	1282.7	1417.4	3.95	81.90
8	Total Fe	E	k32;h7	2	24	8	3	443.8	80.4	357.0	568.7	14.17	0.00	37.0	77.5	85.9	19.35	81.44

Group	Element	sample	Labx	Step	Ntot	Nlab	Neff	Mgen	Sgen	Min	Max	Fval	Pval	sRep	sLab	sRpr	CV	Plab
8	Total K	A	h82	2	30	10	3	15145.5	530.7	14280.0	15960.0	6.70	0.02	355.0	489.5	604.7	3.99	65.53
8	Total K	B	h82	2	30	10	3	13761.0	427.9	12942.3	14210.0	16.38	0.00	183.1	414.7	453.3	3.29	83.68
8	Total K	C	h82	2	30	10	3	15974.9	454.5	15296.7	16533.3	20.34	0.00	174.6	443.2	476.4	2.98	86.57
8	Total K	D	h82	2	30	10	3	26262.5	815.1	25046.7	27450.0	16.05	0.00	352.3	789.3	864.4	3.29	83.38
8	Total K	E	k32;k48	3	21	7	3	236.0	45.8	171.0	275.7	54.12	0.00	10.8	45.3	46.6	19.75	94.65
8	Total Mg	A	k82h	2	30	10	3	6818.8	430.4	6234.0	7570.7	18.13	0.00	175.0	418.3	453.5	6.65	85.10
8	Total Mg	B	hk82;k48;84h	3	24	8	3	1703.2	39.1	1645.3	1770.0	11.23	0.00	20.2	37.3	42.4	2.49	77.32
8	Total Mg	C	h82k	2	30	10	3	3785.4	221.7	3541.0	4193.3	31.39	0.00	68.5	218.1	228.7	6.04	91.02
8	Total Mg	D	hk82;h48	3	27	9	3	6443.4	166.6	6146.3	6708.3	16.40	0.00	71.3	161.4	176.5	2.74	83.69
8	Total Mg	E	hk84	2	27	9	3	516.9	42.9	463.3	598.1	52.01	0.00	10.3	42.5	43.7	8.46	94.45
8	Total Mn	A	hk82	2	30	10	3	629.1	69.1	515.0	757.0	38.75	0.00	19.2	68.2	70.8	11.26	92.64
8	Total Mn	B	hk82;k48	3	27	9	3	145.2	10.9	121.7	158.0	57.17	0.00	2.5	10.8	11.1	7.63	94.93
8	Total Mn	C	hk82	2	30	10	3	396.3	36.3	312.7	449.3	33.65	0.00	10.8	35.8	37.4	9.43	91.59
8	Total Mn	D	hk82;k14;h84	3	24	8	3	1148.0	36.2	1095.7	1190.0	12.73	0.00	17.6	34.8	39.0	3.40	79.64
8	Total Mn	E	k32	2	27	9	3	20.0	2.1	17.3	23.0	17.07	0.00	0.9	2.0	2.2	11.04	84.27
8	Total Na	A	hk82;k84h	3	27	9	3	11705.3	501.2	11201.7	12500.0	30.03	0.00	158.4	492.8	517.7	4.42	90.63
8	Total Na	B	hk82	2	30	10	3	5079.5	158.9	4867.0	5325.0	17.63	0.00	65.5	154.3	167.7	3.30	84.72
8	Total Na	C	hk84;hk82;hk3;14k	5	21	7	3	984.6	45.9	918.1	1045.0	21.57	0.00	17.1	44.8	47.9	4.87	87.27
8	Total Na	D	k82h;hk3;h84	4	24	8	3	3303.0	214.6	3100.7	3730.0	25.51	0.00	73.6	210.3	222.8	6.75	89.09
8	Total Na	E		1	27	9	3	147.9	103.0	37.8	358.6	537.48	0.00	7.7	102.9	103.2	69.78	99.44
9	Reactive Al	A	k38;h67;h64	3	72	24	3	2590.0	192.0	2343.3	2966.7	22.65	0.00	69.9	187.7	200.3	7.73	87.83
9	Reactive Al	B	h67;h83;h64	4	72	24	3	1372.1	129.3	1080.0	1658.7	43.58	0.00	33.9	127.8	132.2	9.64	93.42
9	Reactive Al	C	k48;h67	2	75	25	3	771.3	161.7	336.0	1113.0	120.55	0.00	25.5	161.0	163.0	21.13	97.55
9	Reactive Al	D	k14;k38;k3	4	72	24	3	1725.6	569.2	37.1	3077.7	572.64	0.00	41.2	568.7	570.2	33.04	99.48
9	Reactive Al	E		1	75	25	3	229.3	89.2	6.3	315.0	544.33	0.00	6.6	89.1	89.3	38.96	99.45
9	Reactive Fe	A	h67;h10	3	75	25	3	5637.4	535.8	4396.8	6497.3	19.89	0.00	208.1	522.2	562.1	9.97	86.29
9	Reactive Fe	B	64k;h67	2	75	25	3	2857.9	225.4	2419.4	3333.7	35.12	0.00	65.9	222.2	231.8	8.11	91.92
9	Reactive Fe	C	k35;h67	2	75	25	3	1763.3	311.5	1158.9	2483.3	69.77	0.00	64.6	309.2	315.9	17.92	95.82
9	Reactive Fe	D	h10;k3;h67	3	72	24	3	3781.9	758.1	2507.1	5516.7	129.97	0.00	115.2	755.1	763.9	20.20	97.73
9	Reactive Fe	E	k64	2	75	25	3	305.3	99.0	7.6	423.4	263.51	0.00	10.6	98.8	99.3	32.54	98.87

**Legend**

Name variable	Description
Group	Group number
Element	Element code
Sample	Sample
Labx	Excluded laboratories and evaluation (1 <sup>st</sup> run)
Step	N° of exclusion steps. Only the output of the last step is provided.
Ntot	Total number of observation (after outliers have been excluded)
Nlab	Total number of laboratories (after outliers have been excluded)
Neff	Average number of replicates, corrected for imbalances
Mgen	Average value of the measurements
Sgen	General standard deviation

Name variable	Description
Min	Minimum value
Max	Maximum value
Fval	F-test for laboratory effect
Pval	p-value for the F-test
SRep	Within laboratory standard deviation
SLab	Between laboratory standard deviation
SRpr	Reproducibility standard deviation
CV	Coefficient of variation of the reproducibility standard deviation $CV = rRepr/Mgen*100$
Plab	Percentage of the between laboratory variance in the total variance $PLab = \sqrt{(sLab^2/sRepr^2)}*100$