



**WAGENINGEN EVALUATING PROGRAMS
FOR ANALYTICAL LABORATORIES**

Certificate of Analysis



International Soil-Analytical Exchange

REFERENCE MATERIAL

ISE sample 874



General Information

In this report an overview is given of analytical data for this sample collected in our proficiency testing program. The consensus values are calculated using a robust statistical model. With this NDA model mean and standard deviation are calculated using all reported data when at least 8 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into three sections: Consensus Values, Indicative Values and Values for Information. The division is made on the reliability of the data. Consensus Values are based on at least 16 results while the coefficient of variation is smaller than 25 %. Indicative Values are based on at least 8 and less than 16 results or a coefficient of variation between 25 % and 50 %. Other values, based on more than 2 and less than 8 results or a coefficient of variation higher than 50 %, are given for information only.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median and MAD (Median of Absolute Deviation) and the uncertainty in the consensus values. The confidence limits (at 95 % probability) are calculated for these determinands.

In the section with Information Values the following parameters are given: median, MAD and number of results. For determinands which have at least 5 results reported as smaller than (<) the median of these 'smaller than results' is calculated. In some cases this median of '<' values is much smaller than median and mean of the indicative values. This may be caused by a too optimistic (too low) value for the detection limit reported by a (small) majority of participating laboratories who report '<' -values.

All values, expressed on a weight basis (kg or %), are reported in oven dry (105 °C) material. Moisture is reported in the material as received.

Sample information

WEPAL reference materials are from natural sources only. There is no spiking, mixing or other alterations of the samples. For sample preparation the ISE samples are dried at 40 °C and milled to pass a 0.5 mm sieve.

This ISE sample 874 of Sandy soil from Saudi-Arabia is prepared for the WEPAL proficiency programs. The sample is used in 6 periods (or rounds). Only results from the last 5 periods are used. In this way the consensus values will reflect the latest 'state of the art' in the analytical techniques used in the laboratories. The results on which the values in this report are based were taken from the periods given in the following table.

Year	Round	Number
2023	4	1
2022	4	2
2020	2	4
2017	3	1
2014	1	4



Consensus Values ISE 874



Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	g/kg	18.1	1.09	6.0	94	18.1	0.75	0.14	17.92	- 18.37
As	mg/kg	2.91	0.566	19.5	69	3.00	0.400	0.085	2.77	- 3.04
Ba	mg/kg	247	28.1	11.4	85	248	20.0	3.8	241	- 253
Br	mg/kg	13.4	1.29	9.6	49	13.2	0.90	0.23	13.00	- 13.74
Ca	g/kg	71.1	4.27	6.0	108	71.0	3.04	0.51	70.3	- 71.9
Co	mg/kg	4.71	0.645	13.7	74	4.75	0.450	0.094	4.56	- 4.86
Cr	mg/kg	123	25.7	20.9	106	119	18.0	3.1	118	- 128
Fe	g/kg	9.89	0.587	5.9	116	9.90	0.410	0.068	9.78	- 10.00
K	mg/kg	7930	486	6.1	120	7920	338	55	7840	- 8016
Mg	mg/kg	8920	753	8.4	97	8970	537	96	8771	- 9074
Mn	mg/kg	210	22.0	10.5	107	207	15.0	2.7	205	- 214
Na	mg/kg	2320	199	8.6	93	2320	136	26	2278	- 2360
Ni	mg/kg	27.5	3.32	12.1	85	27.7	2.29	0.45	26.7	- 28.2
P	mg/kg	547	57.7	10.5	79	559	41.8	8.1	534	- 560
Rb	mg/kg	25.7	1.98	7.7	70	25.7	1.35	0.30	25.2	- 26.1
S	mg/kg	2690	539	20.1	75	2710	380	78	2564	- 2812
Si	g/kg	333	7.5	2.3	70	331	5.2	1.1	330.7	- 334.3
Sr	mg/kg	316	27.8	8.8	72	319	18.5	4.1	309	- 322
Y	mg/kg	9.02	1.361	15.1	43	9.10	0.900	0.259	8.60	- 9.44
Zn	mg/kg	20.9	3.57	17.1	102	20.9	2.49	0.44	20.2	- 21.6
Zr	mg/kg	460	61.0	13.3	54	466	42.5	10.4	443	- 477
C - elementary	g/kg	26.5	1.21	4.6	128	26.6	0.85	0.13	26.28	- 26.71
Sb	mg/kg	0.228	0.0462	20.2	25	0.233	0.0330	0.0115	0.209	- 0.247
V	mg/kg	35.6	4.89	13.7	90	35.6	3.40	0.64	34.6	- 36.7
Ti	mg/kg	1840	117	6.4	92	1850	83	15	1814	- 1863
N - elementary	g/kg	0.788	0.1026	13.0	227	0.800	0.0700	0.0085	0.774	- 0.801
Ce	mg/kg	20.4	4.28	21.0	58	20.9	2.98	0.70	19.2	- 21.5
La	mg/kg	10.4	1.62	15.6	57	10.5	1.13	0.27	9.95	- 10.8
Nb	mg/kg	5.49	1.034	18.8	30	5.72	0.715	0.236	5.10	- 5.87
Sc	mg/kg	3.89	0.698	17.9	44	4.00	0.527	0.131	3.68	- 4.10
Th	mg/kg	3.54	0.778	22.0	51	3.60	0.560	0.136	3.32	- 3.76
U	mg/kg	1.38	0.213	15.4	32	1.42	0.145	0.047	1.31	- 1.46
Cs	mg/kg	0.905	0.2162	23.9	34	0.984	0.1700	0.0463	0.829	- 0.980
Hg	µg/kg	5.63	1.259	22.3	37	5.90	0.900	0.259	5.21	- 6.05



Consensus Values ISE 874



Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	g/kg	6.99	1.306	18.7	51	7.10	0.907	0.229	6.62	- 7.36
As	mg/kg	2.72	0.341	12.5	61	2.70	0.230	0.055	2.63	- 2.81
Ba	mg/kg	59.9	10.00	16.7	62	61.5	6.93	1.59	57.4	- 62.5
Ca	g/kg	70.7	5.24	7.4	68	70.2	3.59	0.79	69.4	- 72.0
Cd	mg/kg	0.147	0.0260	17.7	61	0.150	0.0179	0.0042	0.140	- 0.153
Co	mg/kg	3.89	0.533	13.7	89	3.90	0.380	0.071	3.78	- 4.00
Cr	mg/kg	31.5	4.59	14.6	114	31.6	3.14	0.54	30.6	- 32.3
Cu	mg/kg	6.53	0.799	12.2	121	6.54	0.550	0.091	6.39	- 6.68
Fe	g/kg	7.75	1.171	15.1	70	7.75	0.825	0.175	7.47	- 8.03
K	mg/kg	1310	240	18.4	70	1320	164	36	1248	- 1363
Mg	mg/kg	7080	824	11.6	69	7180	582	124	6881	- 7277
Mn	mg/kg	152	20.7	13.7	77	154	14.0	3.0	147	- 156
Mo	mg/kg	0.368	0.0841	22.9	27	0.380	0.0601	0.0202	0.334	- 0.401
N	g/kg	0.748	0.1012	13.5	134	0.747	0.0710	0.0109	0.730	- 0.765
Na	mg/kg	344	43.7	12.7	60	349	29.8	7.0	332	- 355
Ni	mg/kg	24.3	2.92	12.0	111	24.2	2.00	0.35	23.7	- 24.8
P	mg/kg	534	46.1	8.6	95	532	31.0	5.9	524	- 543
S	mg/kg	2840	249	8.8	51	2820	176	44	2766	- 2906
Sr	mg/kg	291	45.3	15.6	17	286	30.5	13.7	268	- 314
Zn	mg/kg	17.4	2.65	15.2	114	17.7	1.88	0.31	16.9	- 17.9
V	mg/kg	24.2	2.53	10.5	60	24.3	1.74	0.41	23.5	- 24.8
Be	mg/kg	0.251	0.0564	22.5	26	0.250	0.0395	0.0138	0.228	- 0.274

Method: Aqua Regia (ISO 11466)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Al	g/kg	7.09	0.830	11.7	96	7.09	0.576	0.106	6.92	- 7.26
As	mg/kg	2.61	0.288	11.1	111	2.62	0.200	0.034	2.55	- 2.66
Ba	mg/kg	59.6	7.13	12.0	50	60.4	4.85	1.26	57.6	- 61.6
Be	mg/kg	0.258	0.0378	14.7	42	0.251	0.0275	0.0073	0.246	- 0.270
Ca	g/kg	67.6	4.32	6.4	99	67.3	3.07	0.54	66.7	- 68.4
Cd	mg/kg	0.143	0.0224	15.6	108	0.146	0.0160	0.0027	0.139	- 0.147
Co	mg/kg	3.87	0.385	9.9	108	3.89	0.270	0.046	3.80	- 3.95
Cr	mg/kg	30.4	3.60	11.8	146	30.2	2.45	0.37	29.9	- 31.0
Cu	mg/kg	6.48	0.824	12.7	150	6.51	0.563	0.084	6.35	- 6.62
Fe	g/kg	7.68	0.674	8.8	111	7.67	0.459	0.080	7.56	- 7.81
K	mg/kg	1350	115	8.5	92	1350	80	15	1327	- 1375
Li	mg/kg	5.68	0.940	16.6	32	5.79	0.665	0.208	5.34	- 6.02



Consensus Values ISE 874



Method: Aqua Regia (ISO 11466) (cont.)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Mg	mg/kg	7060	658	9.3	104	6930	460	81	6932	- 7188
Mn	mg/kg	151	14.2	9.4	116	151	9.5	1.6	148.2	- 153.5
Mo	mg/kg	0.357	0.0513	14.4	51	0.364	0.0360	0.0090	0.343	- 0.372
Na	mg/kg	334	35.0	10.5	79	336	24.4	4.9	326	- 342
Ni	mg/kg	24.0	2.20	9.2	142	24.0	1.51	0.23	23.63	- 24.36
P	mg/kg	522	35.2	6.7	91	516	24.0	4.6	515	- 529
Pb	mg/kg	3.14	0.687	21.9	123	3.24	0.470	0.077	3.01	- 3.26
S	mg/kg	2750	182	6.6	76	2740	124	26	2707	- 2790
Se	mg/kg	0.354	0.0628	17.7	36	0.360	0.0475	0.0131	0.333	- 0.375
Sr	mg/kg	291	24.0	8.2	39	289	16.0	4.8	283	- 299
Ti	mg/kg	347	80.2	23.1	34	334	56.5	17.2	319	- 375
U	mg/kg	0.629	0.0559	8.9	23	0.620	0.0400	0.0146	0.605	- 0.653
V	mg/kg	23.9	2.67	11.1	71	24.0	1.80	0.40	23.3	- 24.6
Zn	mg/kg	16.9	1.60	9.5	149	16.9	1.10	0.16	16.62	- 17.13

Method: Extraction with boiling 2M HNO3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Cd	mg/kg	0.141	0.0226	16.1	66	0.143	0.0151	0.0035	0.135	- 0.146
Co	mg/kg	3.40	0.250	7.4	68	3.37	0.175	0.038	3.34	- 3.46
Cr	mg/kg	23.6	2.15	9.1	80	23.6	1.47	0.30	23.1	- 24.1
Cu	mg/kg	5.45	0.478	8.8	77	5.46	0.320	0.068	5.35	- 5.56
Mo	mg/kg	0.134	0.0224	16.8	32	0.135	0.0163	0.0050	0.126	- 0.142
Ni	mg/kg	22.5	2.23	9.9	80	22.5	1.50	0.31	22.0	- 23.0
Pb	mg/kg	2.47	0.421	17.1	64	2.42	0.286	0.066	2.36	- 2.57
Zn	mg/kg	14.0	1.18	8.4	78	14.0	0.80	0.17	13.78	- 14.31

Method: Extraction with 0.01M CaCl2 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
K	mg/kg	49.5	5.09	10.3	32	48.2	3.40	1.12	47.6	- 51.3
Mg	mg/kg	190	11.2	5.9	27	189	7.7	2.7	185	- 194
N - NH4 (as N)	mg/kg	8.62	1.445	16.8	36	8.61	0.995	0.301	8.13	- 9.10
N - NO3 (as N)	mg/kg	44.0	2.64	6.0	36	44.0	1.89	0.55	43.1	- 44.9
Na	mg/kg	228	9.2	4.0	22	229	6.6	2.4	224.1	- 232.2



Consensus Values ISE 874



Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
pH - H2O	...	7.75	0.218	2.8	442	7.73	0.150	0.013	7.73	- 7.77
pH - KCl	...	7.67	0.262	3.4	191	7.67	0.180	0.024	7.64	- 7.71
pH - CaCl2	...	7.68	0.171	2.2	158	7.68	0.120	0.017	7.66	- 7.71
TIC=Tot.Inorg C(as CaCO3)	%	16.0	1.39	8.7	153	16.0	1.00	0.14	15.82	- 16.27
Fraction > 63 µm	%	74.7	4.97	6.7	87	74.7	3.34	0.67	73.6	- 75.7
Org.matter (L.O.I.)	%	2.73	0.483	17.7	174	2.70	0.333	0.046	2.65	- 2.80
TC=Total C (org.+inorg.)	g/kg	26.3	1.15	4.4	186	26.2	0.80	0.11	26.15	- 26.48
TOC=Total Org. C	g/kg	6.89	1.142	16.6	198	6.91	0.805	0.101	6.73	- 7.05
C - org others (W&B a.o.)	g/kg	6.92	1.106	16.0	234	6.96	0.759	0.090	6.78	- 7.06

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Moisture-content	%	1.24	0.243	19.6	177	1.24	0.163	0.023	1.20	- 1.27
delta 13C	‰ V-PDB	-7.83	0.407	5.2	20	-7.80	0.285	0.114	-8.02	- -7.64
delta 15N	‰ Air	4.17	0.566	13.6	19	4.17	0.397	0.162	3.89	- 4.44

Method: Pot. CEC using 1M NH4-acetate at pH=7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Na	cmol+/kg	1.02	0.157	15.4	206	1.01	0.112	0.014	0.999	- 1.04
K	cmol+/kg	0.229	0.0390	17.0	246	0.233	0.0275	0.0031	0.224	- 0.234
Mg	cmol+/kg	2.13	0.339	16.0	244	2.14	0.235	0.027	2.08	- 2.17

Method: Pot. CEC using 1M NH4Cl (BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Na	cmol+/kg	1.02	0.079	7.8	16	1.00	0.061	0.025	0.975	- 1.06
K	cmol+/kg	0.220	0.0195	8.9	16	0.223	0.0143	0.0061	0.209	- 0.230
Mg	cmol+/kg	2.08	0.317	15.3	16	2.04	0.224	0.099	1.91	- 2.25
Ca	cmol+/kg	25.6	1.33	5.2	16	25.7	0.99	0.42	24.9	- 26.3

Method: Act. CEC using cobaltihexamine (AFNOR NFX 31 130)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
CEC	cmol+/kg	5.89	1.199	20.4	38	6.21	0.886	0.243	5.49	- 6.28
Na	cmol+/kg	1.03	0.071	6.9	28	1.03	0.050	0.017	0.999	- 1.05
K	cmol+/kg	0.211	0.0322	15.3	32	0.220	0.0229	0.0071	0.199	- 0.223
Ca	cmol+/kg	20.2	1.65	8.2	32	20.3	1.04	0.36	19.6	- 20.8
Mg	cmol+/kg	1.73	0.168	9.7	32	1.74	0.120	0.037	1.67	- 1.79



Consensus Values ISE 874



Method: Mehlich-3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
B	mg/kg	1.59	0.203	12.7	60	1.59	0.146	0.033	1.54	-	1.65
K	mg/kg	90.8	9.37	10.3	105	91.2	6.40	1.14	89.0	-	92.7
Mg	mg/kg	397	50.9	12.8	100	397	36.8	6.4	387	-	407
Mn	mg/kg	23.8	3.19	13.4	96	23.9	2.25	0.41	23.1	-	24.4
Na	mg/kg	231	30.2	13.1	62	232	20.8	4.8	223	-	239
P	mg/kg	45.3	8.59	18.9	114	46.1	6.00	1.01	43.7	-	46.9

Method: Extraction with 0.01M CaCl₂ - 0.005M DTPA 1:10 (w/v)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Mn	mg/kg	6.92	1.363	19.7	75	7.04	0.940	0.197	6.60	-	7.23

Method: Extraction with 1M KCl 1:10 (w/v)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
N - NH ₄ (as N)	mg/kg	11.4	2.35	20.7	42	11.9	1.70	0.45	10.6	-	12.1
N - NO ₃ (as N)	mg/kg	42.4	3.00	7.1	52	42.0	2.12	0.52	41.6	-	43.3

Method: Phosphorus and related analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
P - Olsen (as P)	mg/kg	14.9	3.15	21.1	180	15.1	2.24	0.29	14.5	-	15.4
P - AL (as P)	mg/kg	279	40.8	14.6	47	274	29.3	7.4	267	-	291

Method: UK Soil Methods

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
P - NaHCO ₃ (1/20)	mg/l	17.6	2.73	15.5	63	17.9	1.90	0.43	16.9	-	18.3
K - NH ₄ NO ₃ (1/5)	mg/l	116	15.5	13.4	67	116	10.9	2.4	111.8	-	119.4
Mg - NH ₄ NO ₃ (1/5)	mg/l	269	37.1	13.8	67	269	25.8	5.7	260	-	278
pH - H ₂ O (2/5)	...	7.77	0.153	2.0	66	7.76	0.110	0.024	7.73	-	7.80



Indicative Values ISE 874



Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Cd	mg/kg	0.153	0.0400	26.2	31	0.159	0.0290	0.0090	0.138	- 0.167
Cu	mg/kg	7.81	1.961	25.1	72	7.84	1.330	0.289	7.35	- 8.27
Ga	mg/kg	4.91	1.465	29.8	42	5.10	1.050	0.283	4.46	- 5.37
I	mg/kg	6.79	0.690	10.2	9	6.96	0.452	0.288	6.27	- 7.31
Li	mg/kg	7.74	1.807	23.3	12	8.04	1.267	0.652	6.60	- 8.88
Mo	mg/kg	0.465	0.1361	29.3	22	0.470	0.0965	0.0363	0.405	- 0.525
Pb	mg/kg	6.15	1.828	29.7	65	6.30	1.300	0.283	5.69	- 6.60
Sn	mg/kg	0.590	0.2731	46.3	19	0.600	0.2000	0.0783	0.459	- 0.721
Be	mg/kg	0.469	0.0585	12.5	12	0.460	0.0400	0.0211	0.432	- 0.505
Tl	mg/kg	0.152	0.0339	22.3	14	0.160	0.0260	0.0113	0.133	- 0.171
Nd	mg/kg	9.16	2.443	26.7	35	9.18	1.735	0.516	8.32	- 10.00

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Li	mg/kg	5.84	2.067	35.4	16	5.69	1.449	0.646	4.74	- 6.93
Pb	mg/kg	3.17	1.276	40.3	74	3.30	0.880	0.185	2.87	- 3.46
Se	mg/kg	0.396	0.1439	36.3	16	0.422	0.1010	0.0450	0.320	- 0.472
Tl	mg/kg	0.0561	0.0199	35.5	8	0.0640	0.0150	0.0088	0.0399	- 0.0723
Ti	mg/kg	270	108.0	39.9	18	283	76.9	31.8	217	- 324
U	mg/kg	0.615	0.1267	20.6	8	0.626	0.0855	0.0560	0.512	- 0.718

Method: Aqua Regia (ISO 11466)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Ag	µg/kg	11.3	5.43	48.1	9	14.2	4.20	2.26	7.20	- 15.4
B	mg/kg	9.09	3.407	37.5	38	9.48	2.485	0.691	7.97	- 10.2
Bi	mg/kg	0.0406	0.0025	6.1	10	0.0405	0.0020	0.0010	0.0389	- 0.0424
Hg	µg/kg	5.94	2.416	40.7	32	6.37	1.615	0.534	5.07	- 6.81
La	mg/kg	5.24	1.072	20.5	8	5.36	0.770	0.474	4.37	- 6.12
Sb	mg/kg	0.140	0.0355	25.4	32	0.144	0.0250	0.0078	0.127	- 0.153
Sn	mg/kg	0.290	0.0826	28.5	17	0.309	0.0590	0.0250	0.248	- 0.332
Tl	mg/kg	0.0524	0.0205	39.2	20	0.0540	0.0140	0.0057	0.0428	- 0.0619

Method: Extraction with boiling 2M HNO3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits	
Tl	mg/kg	0.0336	0.0060	17.8	12	0.0337	0.0041	0.0022	0.0299	- 0.0374



Indicative Values ISE 874



Method: Extraction with 0.01M CaCl₂ 1:10

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
B	µg/kg	558	60.2	10.8	13	560	39.5	20.9	522	-	594
Co	µg/kg	9.06	2.377	26.2	10	9.19	1.628	0.940	7.38	-	10.7
Mn	mg/kg	0.578	0.1374	23.8	12	0.595	0.0950	0.0496	0.492	-	0.665
N total soluble	mg/kg	68.8	5.55	8.1	11	68.3	3.67	2.09	65.1	-	72.4
P	mg/kg	1.04	0.380	36.4	34	1.02	0.260	0.081	0.912	-	1.18

Method: Soil characteristics

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Fraction < 2 µm	%	7.34	1.928	26.3	148	7.51	1.295	0.198	7.03	-	7.65
EC-SC (ISO 11265)	mS/m	189	56.8	30.0	180	198	39.9	5.3	181	-	197
Fraction < 63 µm	%	24.4	6.76	27.7	102	24.6	4.68	0.84	23.1	-	25.7
Fraction < 16 µm	%	14.6	6.05	41.5	50	14.3	4.17	1.07	12.8	-	16.3
Active Lime (as CaCO ₃)	%	2.42	0.711	29.4	18	2.49	0.540	0.209	2.07	-	2.77

Method: Fluoride (Swiss standard procedure)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
F - Total	mg/kg	286	45.3	15.8	15	285	31.1	14.6	261	-	311

Method: Pot. CEC using 1M NH₄-acetate at pH=7

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
CEC	cmol+/kg	4.60	1.935	42.0	161	4.94	1.390	0.191	4.30	-	4.90
Ca	cmol+/kg	36.6	12.24	33.4	231	36.5	8.26	1.01	35.0	-	38.2
Al	cmol+/kg	0.0185	0.0042	22.8	8	0.0200	0.0030	0.0019	0.0151	-	0.0219

Method: Pot. CEC using 1M or 0.1M BaCl₂-TEA at pH=8.1 (ISO 13536 OR BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Na	cmol+/kg	1.06	0.176	16.7	10	1.06	0.121	0.070	0.932	-	1.18
K	cmol+/kg	0.268	0.0379	14.1	10	0.277	0.0255	0.0150	0.241	-	0.295
Mg	cmol+/kg	1.78	0.187	10.5	10	1.80	0.127	0.074	1.65	-	1.91
Ca	cmol+/kg	7.37	1.064	14.4	10	7.46	0.755	0.421	6.62	-	8.12

Method: Pot. CEC using 1M NH₄Cl (BZE)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Mn	cmol+/kg	0.0052	0.0021	40.6	8	0.0055	0.0015	0.0009	0.0035	-	0.0069



Indicative Values ISE 874



Method: Act. CEC using 0.1M BaCl₂ (UNEP-UN/EC 91065A)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
CEC	cmol+/kg	9.65	0.446	4.6	10	9.62	0.321	0.176	9.34	-	9.97
Na	cmol+/kg	0.987	0.0645	6.5	14	0.989	0.0458	0.0215	0.950	-	1.02
K	cmol+/kg	0.193	0.0152	7.9	14	0.196	0.0115	0.0051	0.184	-	0.201
Ca	cmol+/kg	6.75	0.237	3.5	14	6.78	0.160	0.079	6.61	-	6.88
Mg	cmol+/kg	1.71	0.099	5.8	14	1.73	0.070	0.033	1.66	-	1.77
Mn	cmol+/kg	0.0013	0.0005	40.9	9	0.0014	0.0004	0.0002	0.0009	-	0.0017

Method: Mehlich-3

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ca	mg/kg	20200	5170	25.5	97	20000	3570	660	19200	-	21280
Cu	mg/kg	0.475	0.1725	36.3	83	0.480	0.1170	0.0237	0.437	-	0.513
Fe	mg/kg	21.9	6.07	27.7	90	21.6	4.15	0.80	20.6	-	23.2
Zn	mg/kg	1.15	0.289	25.2	88	1.21	0.210	0.039	1.09	-	1.21

Method: Water soluble 1:10 (w/v) (EN-12457-4)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cl	mg/kg	373	30.1	8.1	9	374	20.5	12.5	350	-	396

Method: Extraction with 0.01M CaCl₂ - 0.005M DTPA 1:10 (w/v)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cu	mg/kg	0.272	0.1301	47.9	69	0.300	0.0900	0.0196	0.241	-	0.303
Fe	mg/kg	3.63	1.524	42.0	73	3.66	1.035	0.223	3.27	-	3.98
Zn	mg/kg	0.529	0.1497	28.3	72	0.545	0.1050	0.0220	0.493	-	0.564

Method: Phosphorus and related analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al - Ox	mg/kg	234	27.1	11.6	14	236	18.9	9.1	218	-	250
Fe - Ox	mg/kg	177	39.5	22.3	14	177	28.2	13.2	154	-	200
P - Ox	mg/kg	270	13.3	4.9	14	274	9.0	4.5	263	-	278

Method: Water soluble 1:10 (w/v) (Neth standard VPR C85-06)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
SO ₄	mg/kg	7010	2626	37.4	13	6860	1660	910	5440	-	8590



Informative Values ISE 874



Method: Real totals

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
B	mg/kg	20.9	3.60	6		
F	mg/kg	564	84.0	7		
Se	mg/kg	1.150	0.5500	9	2.000	17
Ag	mg/kg	0.335	0.1600	4	2.000	15
Bi	mg/kg	3.70	0.600	3	3.00	16
Ge	mg/kg	1.55	0.300	4	2.00	10
W	mg/kg	0.835	0.4700	10	1.000	11

Method: Acid extractable (So-called totals)

Element	Unit	Median	MAD	N	Results smaller than (<)	
					Median of <	N
B	mg/kg	9.14	4.207	30	12.00	5
Rb	mg/kg	14.7	7.73	4		
Si	g/kg	0.358	0.1016	3		
Sn	mg/kg	0.450	0.2140	16	1.500	41
Y	mg/kg	4.06	1.035	5		
Zr	mg/kg	4.43	1.760	5		
Sb	mg/kg	0.223	0.1905	14	1.000	37
Ag	mg/kg	0.0300	0.0190	9	1.0000	20
Bi	mg/kg	0.0460	0.0160	3		
Ce	mg/kg	12.3	2.20	4		
La	mg/kg	5.99	1.931	8		
Sc	mg/kg	1.85	0.360	3		
Hg	µg/kg	10.90	5.600	25	50.00	48
Te	mg/kg	-	-	0	2.00	17

Method: Aqua Regia (ISO 11466)

Element	Unit	Median	MAD	N
Ce	mg/kg	11.3	0.85	4
Rb	mg/kg	6.83	0.200	6
Sc	mg/kg	1.50	0.230	7
Si	g/kg	241	239.8	4
Th	mg/kg	1.36	0.295	6
Y	mg/kg	3.23	0.210	5
Zr	mg/kg	1.40	0.600	3



Informative Values ISE 874



Method: Extraction with boiling 2M HNO₃

Element	Unit	Median	MAD	N	Results smaller than (<)	Median of <	N
Hg	µg/kg	6.32	2.650	33	10.00	32	

Method: Extraction with 0.1M NaNO₃

Element	Unit	Median	MAD	N	Results smaller than (<)	Median of <	N
Cd	µg/kg	0.700	0.3500	3	5.000	30	
Cu	µg/kg	23.9	10.04	8	50.0	25	
Ni	µg/kg	14.2	10.60	7	25.0	26	
Pb	µg/kg	-	-	0	25.0	28	
Zn	µg/kg	19.1	4.10	3	50.0	30	

Method: Extraction with 0.01M CaCl₂ 1:10

Element	Unit	Median	MAD	N	Results smaller than (<)	Median of <	N
Al	µg/kg	364	244.0	3			
Cu	µg/kg	24.5	11.54	13			
Fe	mg/kg	1.40	0.800	9	1.52	6	
SO ₄	mg/kg	262	114.4	8			
Zn	µg/kg	189	80.3	4	101	12	
Ni	µg/kg	13.0	3.54	3			

Method: Other determinations

Element	Unit	Median	MAD	N
B - Hot water	mg/kg	1.18	0.456	44

Method: Digestion with conc. HNO₃ + conc. HCl + H₂O₂ (UNEP-UN/EC 91075A)

Element	Unit	Median	MAD	N
Ba	mg/kg	55.7	38.89	3

Method: Pot. CEC using 1M or 0.1M BaCl₂-TEA at pH=8.1 (ISO 13536 OR BZE)

Element	Unit	Median	MAD	N
CEC	cmol+/kg	5.59	2.575	12

Method: Pot. CEC using 1M NH₄Cl (BZE)

Element	Unit	Median	MAD	N	Results smaller than (<)	Median of <	N



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CEC cmol+/kg 5.16 0.343 4

Method: Pot. CEC using 1M NH4Cl (BZE)

Element	Unit	Median	MAD	N
Al	cmol+/kg	0.0140	0.0010	4
Fe	cmol+/kg	0.0028	0.0004	3

Results smaller than (<)

Median of <	N
0.0010	6

(cont.)

Method: Act. CEC using 0.01M BaCl2 (ISO 11260)

Element	Unit	Median	MAD	N
CEC	cmol+/kg	5.40	0.250	6
Na	cmol+/kg	1.03	0.030	7
K	cmol+/kg	0.300	0.0220	7
Mg	cmol+/kg	1.80	0.090	7
Ca	cmol+/kg	8.10	0.210	7

Method: Act. CEC using 0.1M BaCl2 (UNEP-UN/EC 91065A)

Element	Unit	Median	MAD	N
Al	cmol+/kg	0.0080	0.0019	3
Fe	cmol+/kg	0.0012	0.0002	6

Results smaller than (<)

Median of <	N
0.1110	5

Method: Act. CEC using cobaltihexamine (AFNOR NFX 31 130)

Element	Unit	Median	MAD	N
Al	cmol+/kg	0.0075	0.0045	9
Fe	cmol+/kg	0.0152	0.0048	5
Mn	cmol+/kg	0.0010	-	6

Results smaller than (<)

Median of <	N
0.0500	5

Method: Mehlich-3

Element	Unit	Median	MAD	N
Al	mg/kg	15.4	6.43	46
As	mg/kg	0.469	0.2240	3
Cd	mg/kg	0.0610	0.0025	6
Cr	mg/kg	0.399	0.0375	4
Pb	mg/kg	0.325	0.2030	7
Co	mg/kg	0.176	0.1160	3

Results smaller than (<)

Median of <	N
22.0	7

Method: Extraction with Ca-lactate (VDLUFA, Germany)

Element	Unit	Median	MAD	N
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K	mg/kg	70.4	22.95	5
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Method: Extraction with Ca-lactate (VDLUFA, Germany)

Element	Unit	Median	MAD	N
P	mg/kg	104	82.0	5

Method: Water soluble 1:10 (w/v) (EN-12457-4)

Element	Unit	Median	MAD	N
N - NO3 (as N)	mg/kg	40.0	3.00	5

Method: Phosphorus and related analysis

Element	Unit	Median	MAD	N
P - Bray (as P)	mg/kg	11.10	10.090	111
P - w (as P)	mg/l soil	6.00	3.370	16

Method: Water soluble 1:10 (w/v) (Neth standard VPR C85-06)

Element	Unit	Median	MAD	N
Cl	mg/kg	360	26.8	7

Method: Extraction with dilute nitric acid (0.43 Mol/l) ISO 17586

Element	Unit	Median	MAD	N
Cu	mg/kg	2.56	1.186	4
Zn	mg/kg	3.44	1.147	4
Fe	g/kg	0.214	0.0635	4
K	mg/kg	143	10.3	4
Mg	mg/kg	1750	128	4
Mn	mg/kg	70.8	3.91	4
P	mg/kg	505	65.0	4
Na	mg/kg	292	4.1	4
S	mg/kg	2590	238	4
Ca	g/kg	69.3	1.17	3

(cont.)