WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 264

WAGENINGEN
UNIVERSITY & RESEARCH

marsep

Certificate of Analysis MARSEP 264

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, the mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 8 results and a maximum relative uncertainty of 6.25%. Indicative Values are based on a maximum relative uncertainty of 35% and a minimum of 4 and maximum of 7 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation), the uncertainty of the mean (consensus or indicative) value and the relative uncertainty.

All values, expressed on a weight basis (kg or %), are reported as oven-dried (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 MARSEP samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This MARSEP sample 264 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 14 periods (or rounds). Only results from the last 5 periods are used. This way, the consensus values reflect the latest 'state of the art' analytical techniques used by the laboratories.It also gives a better estimate of the concentrations of non-stable or volatile determinands. The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2024	1	1
2021	4	3
2021	3	4
2021	2	2
2021	1	1

marsep

Consensus Values MARSEP 264

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ag	µg/kg	228	21.9	9.6	15	232	14.0	7.06	3.10
Al	g/kg	7.17	2.29	31.9	61	7.13	1.51	0.366	5.11
As	mg/kg	5.14	0.447	8.7	65	5.15	0.268	0.069	1.35
B	mg/kg	19.1	4.70	24.5	53	19.3	2.82	0.807	4.21
Ba	mg/kg	74.6	10.9	14.6	28	73.4	6.75	2.57	3.45
Be	µg/kg	356	60.5	17.0	22	350	38.0	16.1	4.53
Bi	µg/kg	147	19.4	13.2	9	146	8.00	8.09	5.50
Ca	g/kg	72.1	3.99	5.5	126	72.0	2.60	0.444	0.616
Cd	mg/kg	0.314	0.034	11.0	114	0.319	0.021	0.004	1.28
Co	mg/kg	4.95	0.433	8.7	110	4.96	0.279	0.052	1.04
Cr	mg/kg	61.1	14.8	24.3	124	61.0	10.9	1.66	2.72
Cu	mg/kg	41.7	2.84	6.8	134	41.7	1.77	0.307	0.736
Fe	g/kg	10.6	1.01	9.5	94	10.7	0.703	0.130	1.22
Hg	µg/kg	227	35.2	15.5	111	228	18.5	4.17	1.84
K	g/kg	12.0	1.30	10.8	144	11.9	0.900	0.135	1.13
Mg	g/kg	10.5	0.618	5.9	136	10.5	0.400	0.066	0.631
Mn	mg/kg	422	33.8	8.0	95	423	21.5	4.33	1.03
Mo	mg/kg	3.15	0.348	11.0	102	3.17	0.214	0.043	1.37
Na	g/kg	0.776	0.106	13.7	78	0.782	0.066	0.015	1.94
Ni	mg/kg	21.1	2.05	9.7	125	21.0	1.32	0.230	1.09
N	g/kg	13.1	0.753	5.7	127	13.1	0.471	0.084	0.636
P	g/kg	2.83	0.207	7.3	146	2.82	0.122	0.021	0.756
Pb	mg/kg	32.6	3.73	11.4	121	33.2	2.33	0.423	1.30
Sb	µg/kg	989	111	11.2	21	1000	62.5	30.3	3.06
Sr	mg/kg	148	12.6	8.5	20	148	8.28	3.51	2.38
V	mg/kg	17.3	4.06	23.4	45	18.1	2.80	0.756	4.37
Zn	mg/kg	127	9.78	7.7	135	127	5.88	1.05	0.826
S	mg/kg	1824	165	9.1	57	1803	99.9	27.4	1.50
TC =totalC (org+inorg)	g/kg	187	6.72	3.6	36	187	3.86	1.40	0.748
TOC =total org.C	g/kg	172	14.0	8.1	9	171	8.09	5.83	3.38

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	47.8	5.56	11.6	26	48.0	3.80	1.36	2.85
loss-on-ignition	%	31.3	1.02	3.3	106	31.3	0.700	0.124	0.396
residu-on-ignition	%	68.4	1.48	2.2	16	68.2	0.860	0.462	0.675
dry weight	%	96.3	0.559	0.6	54	96.3	0.385	0.095	0.099

Indicative Values MARSEP 264

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Ga	µg/kg	2365	476	20.1	6	2507	315	243	10.3
Li	mg/kg	11.1	2.69	24.2	17	10.8	1.51	0.816	7.34
S - SO4 (as S)	mg/kg	1729	322	18.6	8	1756	227	142	8.22
Se	µg/kg	303	291	95.8	19	408	200	83.3	27.5
Sn	mg/kg	2.62	0.652	24.9	21	2.57	0.441	0.178	6.78
Ti	mg/kg	204	146	71.8	12	223	107	52.8	25.9
Tl	µg/kg	100.0	59.6	59.6	14	95.9	34.1	19.9	19.9
U	mg/kg	0.698	0.126	18.1	11	0.695	0.077	0.047	6.80
Ce	mg/kg	15.9	2.82	17.7	4	15.1	1.50	1.76	11.1
OC = org.C	g/kg	165	13.3	8.1	6	165	8.00	6.79	4.11