WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Manure and Refuse Sample Exchange Program

REFERENCE MATERIAL

MARSEP sample 235

WAGENINGEN
UNIVERSITY & RESEARCH

marsep

Certificate of Analysis MARSEP 235

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 235 of Compost, from Belgium, is prepared for the WEPAL proficiency programs. The sample has been used in 17 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	3	2
2023	1	4
2020	4	4
2018	2	4
2016	1	3

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Consensus Values MARSEP 235

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	0.625	0.123	19.6	55	0.627	0.087	0.021	3.31
As	mg/kg	0.764	0.166	21.7	39	0.790	0.121	0.033	4.34
Ba	mg/kg	8.37	1.24	14.8	28	8.54	1.10	0.293	3.50
Ca	g/kg	21.1	1.28	6.1	119	21.0	0.890	0.146	0.695
Cd	mg/kg	0.209	0.032	15.1	113	0.210	0.018	0.004	1.78
Co	mg/kg	0.361	0.049	13.7	75	0.360	0.030	0.007	1.98
Cr	mg/kg	3.37	0.622	18.4	110	3.41	0.405	0.074	2.20
Cu	mg/kg	14.2	1.27	9.0	129	14.2	0.820	0.140	0.986
Fe	g/kg	0.968	0.123	12.7	92	0.974	0.073	0.016	1.66
Hg	µg/kg	37.6	8.28	22.0	87	37.8	4.80	1.11	2.95
K	g/kg	1.71	0.167	9.8	140	1.70	0.102	0.018	1.03
Mg	g/kg	6.08	0.461	7.6	129	6.08	0.280	0.051	0.834
Mn	mg/kg	50.0	4.63	9.3	87	49.9	3.42	0.620	1.24
Mo	mg/kg	14.2	1.05	7.4	97	14.2	0.600	0.133	0.934
Na	g/kg	0.455	0.067	14.7	64	0.453	0.048	0.010	2.30
Ni	mg/kg	1.56	0.275	17.7	97	1.57	0.162	0.035	2.24
N	g/kg	11.3	0.650	5.7	132	11.3	0.370	0.071	0.623
P	g/kg	0.675	0.057	8.5	137	0.680	0.030	0.006	0.908
Pb	mg/kg	14.0	2.34	16.7	123	14.3	1.60	0.263	1.88
Sb	µg/kg	345	71.2	20.6	21	349	43.0	19.4	5.63
Se	µg/kg	591	87.9	14.9	23	598	42.1	22.9	3.87
Sr	mg/kg	42.5	3.63	8.5	18	42.8	1.45	1.07	2.52
V	mg/kg	2.14	0.352	16.5	34	2.17	0.265	0.075	3.53
Zn	mg/kg	35.2	3.99	11.3	131	35.5	2.50	0.436	1.24
S	mg/kg	2990	331	11.1	48	3000	218	59.7	2.00
TC =totalC (org+inorg)	g/kg	478	40.9	8.6	38	489	29.0	8.30	1.73
U	mg/kg	0.293	0.039	13.2	8	0.294	0.021	0.017	5.83
TOC =total org.C	g/kg	487	65.9	13.5	8	499	41.5	29.1	5.98

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
AOX	mg/kg	485	44.6	9.2	28	483	31.5	10.5	2.17
loss-on-ignition	%	90.3	0.433	0.5	109	90.3	0.290	0.052	0.057
residue-on-ignition	%	9.59	0.513	5.4	14	9.57	0.424	0.172	1.79
dry weight	%	87.1	1.11	1.3	36	87.0	0.715	0.232	0.266

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Indicative Values MARSEP 235

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	6.12	2.10	34.3	41	6.30	1.25	0.409	6.69
Be	µg/kg	34.7	11.6	33.5	6	37.4	6.60	5.93	17.1
Bi	µg/kg	36.3	9.20	25.3	4	36.3	4.71	5.75	15.8
Ga	µg/kg	248	85.1	34.3	4	271	45.5	53.2	21.5
Li	mg/kg	0.603	0.219	36.3	7	0.679	0.117	0.104	17.2
N - NO3 (as N)	mg/kg	498	10.4	2.1	4	496	5.57	6.53	1.31
S - SO4 (as S)	mg/kg	2996	560	18.7	6	2806	429	286	9.54
Sn	mg/kg	0.249	0.138	55.4	17	0.271	0.091	0.042	16.8
Ti	mg/kg	31.4	12.9	41.1	12	34.6	7.85	4.66	14.8
OC = org.C	g/kg	496	88.8	17.9	4	495	43.8	55.5	11.2