WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

BiMEP

International Biomass Exchange Program

REFERENCE MATERIAL

BIMEP sample 417

WAGENINGEN
UNIVERSITY & RESEARCH

BiMEP

Certificate of Analysis BIMEP 417

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 BIMEP samples are dried at 40°C and milled to pass a 0.5 mm sieve.

This BIMEP sample 417 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 3 periods (or rounds). The results on which the values in this report are based were taken from the periods given in the following table:

Year	Round	Number
2019	1	3
2013	2	2
2009	1	1

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Consensus Values BIMEP 417

Method: General Analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Calorific Value (gross)	MJ/kg	5.67	0.382	6.7	22	5.66	0.240	0.102	1.79
Ash	% (m/m)	71.1	1.08	1.5	29	71.0	0.610	0.250	0.351
Moisture	% (m/m)	3.78	0.395	10.5	29	3.76	0.171	0.092	2.43
Volatile Matter	% (m/m)	26.9	1.32	4.9	23	26.9	0.900	0.344	1.28

Method: Elementary Analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Carbon (C)	% (m/m)	16.8	0.997	5.9	25	16.7	0.733	0.249	1.48
Hydrogen (H)	% (m/m)	1.71	0.197	11.5	23	1.71	0.100	0.051	2.99
Nitrogen (N)	% (m/m)	1.42	0.133	9.3	25	1.38	0.090	0.033	2.34

Method: Major Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
K	g/kg	15.7	2.54	16.2	13	16.5	1.43	0.882	5.62
Mg	g/kg	8.64	0.942	10.9	13	8.72	0.350	0.326	3.78

Method: Minor Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Co	mg/kg	6.18	0.736	11.9	11	6.17	0.428	0.277	4.49
Cu	mg/kg	42.3	7.50	17.7	15	43.0	3.61	2.42	5.72
Mn	mg/kg	634	117	18.5	16	631	72.2	36.7	5.78
Ni	mg/kg	26.9	1.29	4.8	14	27.0	0.450	0.432	1.60
Pb	mg/kg	39.5	6.28	15.9	14	39.2	4.99	2.10	5.31
Zn	mg/kg	135	22.6	16.8	15	129	14.3	7.29	5.42

Indicative Values BIMEP 417

Method: Elementary Analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
S	g/kg	1.48	0.829	55.8	24	1.51	0.500	0.211	14.2
Cl	g/kg	0.806	0.601	74.6	23	0.726	0.363	0.157	19.4
Oxygen (O)	% (m/m)	8.16	1.04	12.8	5	8.50	0.700	0.583	7.14

Method: Major Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	g/kg	25.7	5.56	21.7	13	26.1	2.83	1.93	7.51
Ca	g/kg	47.7	9.25	19.4	13	48.1	3.46	3.21	6.72
Fe	g/kg	16.6	4.43	26.7	13	18.0	4.60	1.54	9.26
Na	g/kg	4.17	0.956	22.9	13	4.38	0.510	0.331	7.94
P	g/kg	3.68	1.16	31.5	13	3.74	0.530	0.401	10.9
Si	g/kg	181	85.0	47.0	13	168	49.2	29.5	16.3

Method: Minor Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
As	mg/kg	7.27	1.75	24.1	12	7.09	1.06	0.632	8.69
Ba	mg/kg	150	47.7	31.8	12	155	30.9	17.2	11.5
Be	mg/kg	0.647	0.132	20.3	6	0.650	0.055	0.067	10.4
Cd	mg/kg	0.377	0.175	46.5	10	0.420	0.105	0.069	18.4
Cr	mg/kg	109	24.3	22.2	14	108	13.8	8.12	7.43
Hg	mg/kg	0.100	0.018	17.9	11	0.101	0.009	0.007	6.76
Mo	mg/kg	3.73	0.746	20.0	9	3.83	0.430	0.311	8.32
Sb	mg/kg	1.04	0.393	37.9	7	1.10	0.240	0.186	17.9
Sn	mg/kg	3.63	2.08	57.4	10	3.82	0.950	0.824	22.7
Tl	mg/kg	0.243	0.028	11.6	4	0.250	0.015	0.018	7.24
V	mg/kg	35.2	8.99	25.5	12	35.5	4.85	3.24	9.20
Ti	mg/kg	997	956	95.9	10	1007	655	378	37.9