WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

BiMEP

International Biomass Exchange Program

REFERENCE MATERIAL

BIMEP sample 431

WAGENINGEN
UNIVERSITY & RESEARCH

BiMEP

Certificate of Analysis BIMEP 431

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 a maximum of 8 results, or a relative uncertainty greater than 6.25% when there are at least 8 results.

In the sections with Consensus Values and Indicative Values the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation) and the uncertainty of the mean (consensus or indicative) values.

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 431 of Compost, from Switzerland, is prepared for the WEPAL proficiency programs. The sample has been used in 5 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
2021	4	1
2018	4	4
2015	1	4
2013	3	3
2010	1	4

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Consensus Values BIMEP 431

Method: General Analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
Calorific Value (gross)	MJ/kg	4.50	0.196	4.4	42	4.52	0.139	0.038
Ash	% (m/m)	75.9	0.77	1.0	50	75.8	0.50	0.14
Moisture	% (m/m)	3.75	0.411	11.0	51	3.72	0.250	0.072
Volatile Matter	% (m/m)	24.0	0.81	3.4	35	24.0	0.50	0.17

Method: Elementary Analysis

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
Carbon (C)	% (m/m)	14.0	0.53	3.8	42	13.9	0.33	0.10
Hydrogen (H)	% (m/m)	1.48	0.199	13.4	37	1.52	0.112	0.041
Nitrogen (N)	% (m/m)	1.05	0.081	7.7	43	1.04	0.050	0.015

Method: Major Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
Ca	g/kg	50.3	9.07	18.0	17	51.2	4.93	2.75
Fe	g/kg	18.8	3.63	19.3	19	20.0	1.21	1.04
Mg	g/kg	9.57	1.188	12.4	17	9.47	0.630	0.360

Method: Minor Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
Hg	mg/kg	0.0911	0.0121	13.3	13	0.0930	0.0070	0.0042
Mn	mg/kg	669	134.0	20.0	22	673	85.0	35.7
Ni	mg/kg	30.7	6.04	19.7	19	31.2	3.00	1.73

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Indicative Values BIMEP 431

Method: Major Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
Al	g/kg	31.8	7.03	22.1	15	32.3	3.01	2.27
K	g/kg	13.1	5.40	41.3	18	14.8	4.04	1.59

Method: Minor Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty
As	mg/kg	8.69	2.317	26.7	14	9.26	1.333	0.774
Ba	mg/kg	136	65.1	47.7	16	136	58.9	20.3
Be	mg/kg	0.858	0.4193	48.9	9	0.980	0.2800	0.1747
Co	mg/kg	7.48	2.236	29.9	15	7.70	1.122	0.722
Cu	mg/kg	44.7	12.56	28.1	21	45.0	7.30	3.43
Hg	mg/kg	0.0911	0.0121	13.3	13	0.0930	0.0070	0.0042
Mo	mg/kg	3.56	1.185	33.3	10	3.55	0.850	0.468
Pb	mg/kg	36.6	10.89	29.8	18	37.0	6.00	3.21
Sn	mg/kg	3.43	1.335	39.0	11	3.23	0.715	0.503
V	mg/kg	47.8	13.71	28.7	13	51.1	9.57	4.75
Zn	mg/kg	128	33.3	25.9	21	133	19.8	9.1
Ti	mg/kg	1636	779.5	47.6	12	1686	472.2	281.3