



**WAGENINGEN EVALUATING PROGRAMS  
FOR ANALYTICAL LABORATORIES**

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**Certificate of Analysis**

**B<sup>i</sup>MEP**

**International Biomass Exchange Program**

**REFERENCE MATERIAL**

**BIMEP sample 424**

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

This BIMEP sample 424 of Compost from Belgium is prepared for the WEPAL proficiency programs. The sample is 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
2014	1	3
2011	1	4
2009	3	4

**Consensus Values BIMEP 424**

**Method: General Analysis**

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ash	% (m/m)	9.95	0.521	5.2	31	9.94	0.360	0.117	9.75	-	10.14
Moisture	% (m/m)	14.4	0.65	4.5	32	14.3	0.47	0.14	14.15	-	14.62
Calorific Value (gross)	MJ/kg	19.2	0.25	1.3	30	19.2	0.18	0.06	19.08	-	19.27
Volatile Matter	% (m/m)	66.5	1.11	1.7	23	66.6	0.80	0.29	66.1	-	67.0

**Method: Elementary Analysis**

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Carbon (C)	% (m/m)	50.5	0.81	1.6	32	50.4	0.59	0.18	50.20	-	50.79
Hydrogen (H)	% (m/m)	5.12	0.238	4.6	29	5.12	0.165	0.055	5.03	-	5.21
Nitrogen (N)	% (m/m)	1.18	0.081	6.9	32	1.18	0.053	0.018	1.15	-	1.21
Cl	g/kg	0.763	0.0673	8.8	25	0.770	0.0440	0.0168	0.735	-	0.790
S	g/kg	2.86	0.526	18.4	26	2.84	0.364	0.129	2.65	-	3.07

**Method: Minor Elements**

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Cu	mg/kg	13.6	1.53	11.3	19	14.0	1.10	0.44	12.9	-	14.3
Mn	mg/kg	54.4	9.57	17.6	17	55.8	6.93	2.90	49.5	-	59.3
Pb	mg/kg	14.1	2.31	16.3	16	14.9	1.66	0.72	12.9	-	15.4
Zn	mg/kg	34.5	6.22	18.0	19	33.6	3.90	1.78	31.5	-	37.5

Indicative Values BIMEP 424

Method: Major Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Al	g/kg	1.33	0.599	45.2	15	1.40	0.440	0.193	0.996	-	1.65
Ca	g/kg	23.4	6.01	25.7	15	24.3	4.30	1.94	20.1	-	26.7
Fe	g/kg	1.08	0.329	30.5	15	1.13	0.244	0.106	0.898	-	1.26
K	g/kg	2.09	0.589	28.2	15	2.20	0.406	0.190	1.76	-	2.41
Mg	g/kg	6.39	2.288	35.8	15	6.55	1.693	0.738	5.14	-	7.65
Na	g/kg	0.611	0.1605	26.3	15	0.640	0.1130	0.0518	0.523	-	0.699
P	g/kg	0.724	0.1253	17.3	15	0.783	0.0970	0.0404	0.655	-	0.793

Method: Minor Elements

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	95 % confidence limits		
Ba	mg/kg	10.3	3.51	34.0	14	10.5	2.50	1.17	8.30	-	12.3
Cd	mg/kg	0.228	0.0460	20.2	14	0.235	0.0345	0.0154	0.201	-	0.254
Cr	mg/kg	3.46	0.687	19.9	15	3.47	0.470	0.222	3.08	-	3.84
F	mg/kg	23.1	9.14	39.7	8	22.7	6.57	4.04	15.6	-	30.5
Hg	mg/kg	0.0328	0.0030	9.1	10	0.0331	0.0021	0.0012	0.0307	-	0.0349
Mo	mg/kg	13.3	2.39	17.9	12	13.3	1.79	0.86	11.8	-	14.8
Ni	mg/kg	1.42	0.445	31.3	14	1.41	0.300	0.149	1.17	-	1.68
V	mg/kg	2.44	0.697	28.6	13	2.40	0.500	0.242	2.02	-	2.85



# BIMEP

## Informative Values BIMEP 424

### Method: Water Soluble Elements

Element	Unit	Median	MAD	N
Cl	g/kg	0.388	0.1259	4
K	g/kg	1.32	0.699	5
Na	g/kg	0.382	0.1140	5

### Method: Major Elements

Element	Unit	Median	MAD	N
Si	g/kg	7.75	4.471	14

### Method: Minor Elements

Element	Unit	Median	MAD	N
As	mg/kg	1.42	0.480	13
Co	mg/kg	0.595	0.2945	10
Sb	mg/kg	0.700	0.4500	9
Se	mg/kg	0.775	0.3800	6
Sn	mg/kg	0.350	0.1425	8
Ti	mg/kg	104.0	50.00	11

### Results smaller than (<)

Median of <	N
1.000	5
0.300	5