WAGENINGEN EVALUATING PROGRAMS

FOR ANALYTICAL LABORATORIES

Certificate of Analysis

International Plant-Analytical Exchange

REFERENCE MATERIAL

IPE sample 182

WAGENINGEN
UNIVERSITY & RESEARCH

Certificate of Analysis IPE 182

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 IPE samples are dried at 70°C and milled to pass a 0.5 mm sieve.

This IPE sample 182 of wheat (grain) / Triticum vulgare, from Netherlands, 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
2016	2	4
2011	3	1
2007	3	4

Consensus Values IPE 182

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
B	mg/kg	1.44	0.914	63.4	195	1.50	0.600	0.082	5.67
Cu	mg/kg	4.17	0.495	11.9	318	4.18	0.295	0.035	0.832
Fe	mg/kg	166	20.8	12.5	316	165	14.5	1.46	0.878
Mn	mg/kg	12.4	1.46	11.8	317	12.4	0.900	0.102	0.826
Zn	mg/kg	27.4	2.15	7.9	318	27.4	1.39	0.151	0.551
As	µg/kg	72.9	13.3	18.2	52	73.5	8.95	2.30	3.15
Cd	µg/kg	16.5	6.61	40.0	72	17.7	4.30	0.974	5.89
Co	µg/kg	42.3	8.47	20.0	61	42.0	5.04	1.36	3.21
Cr	µg/kg	332	98.5	29.6	71	338	63.0	14.6	4.40
Li	µg/kg	155	23.9	15.4	18	155	14.0	7.03	4.54
Mo	µg/kg	795	91.1	11.5	90	793	53.0	12.0	1.51
Ni	µg/kg	199	72.7	36.6	67	201	42.7	11.1	5.59
Pb	µg/kg	183	50.9	27.8	85	189	29.0	6.89	3.77
Se	µg/kg	30.6	7.99	26.1	34	31.0	4.89	1.71	5.60
Ba	mg/kg	2.04	0.329	16.1	35	2.06	0.200	0.069	3.40
V	µg/kg	248	49.1	19.8	31	257	31.0	11.0	4.44
Sr	mg/kg	4.82	0.380	7.9	37	4.83	0.214	0.078	1.62
Rb	µg/kg	3818	321	8.4	12	3814	200	116	3.04
Ca	g/kg	0.728	0.102	14.1	328	0.730	0.067	0.007	0.970
Cl (as Cl)	g/kg	0.996	0.157	15.8	60	0.988	0.099	0.025	2.55
K	g/kg	4.44	0.357	8.0	343	4.46	0.230	0.024	0.542
Mg	g/kg	1.20	0.093	7.8	339	1.20	0.060	0.006	0.529
N - Kjeldahl (as N)	g/kg	14.5	0.836	5.7	230	14.5	0.537	0.069	0.474
Na	mg/kg	49.5	18.1	36.6	170	50.4	10.8	1.74	3.51
P (as P)	g/kg	3.46	0.228	6.6	342	3.45	0.150	0.015	0.446
S (as S)	g/kg	1.13	0.121	10.7	188	1.13	0.070	0.011	0.976

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
C - elementary	g/kg	439	14.4	3.3	99	439	8.70	1.81	0.412
N - elementary	g/kg	15.0	0.645	4.3	155	15.1	0.400	0.065	0.431

Method: Acid extractable (So-called totals)

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	119	24.8	20.8	68	121	14.0	3.76	3.15

Consensus Values IPE 182

Method: Other determinations

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
delta 13C	‰ V-PDB	-27.9	0.335	1.2	17	-27.9	0.210	0.101	0.363
delta 15N	‰ Air	4.46	0.584	13.1	18	4.46	0.395	0.172	3.86

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Crude fibre	g/kg	35.1	5.59	15.9	18	33.8	2.75	1.65	4.69
ADF-ash-free	g/kg	48.7	7.28	14.9	11	47.1	5.00	2.74	5.63
Total ash	g/kg	29.8	1.52	5.1	33	30.0	1.00	0.330	1.11

Indicative Values IPE 182

Method: Inorganic Chemical Composition

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Br	mg/kg	22.2	5.39	24.3	4	22.0	2.55	3.37	15.2
Hg	µg/kg	1.89	1.09	57.9	43	2.13	0.870	0.208	11.0
I	µg/kg	109	67.2	61.5	11	118	41.3	25.3	23.2
Bi	µg/kg	18.4	5.75	31.3	8	18.8	3.89	2.54	13.8
Sb	µg/kg	6.71	2.72	40.5	12	7.30	1.34	0.981	14.6
Sn	µg/kg	22.0	11.0	49.8	11	21.7	4.40	4.14	18.8
Ti	mg/kg	3.78	2.42	64.1	13	3.60	1.84	0.840	22.2
Be	µg/kg	4.56	3.29	72.3	14	5.02	1.88	1.10	24.2
Cs	µg/kg	27.4	2.29	8.4	5	26.7	1.10	1.28	4.68
N - NH4 (as N)	mg/kg	27.3	13.3	48.6	9	29.4	8.60	5.53	20.3
N - NO3 (as N)	mg/kg	12.4	17.0	137.0	16	15.6	13.5	5.30	42.8
SO4 (as SO4)	g/kg	0.162	0.124	76.4	9	0.180	0.090	0.052	31.9

Method: Real totals

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
Al	mg/kg	156	61.4	39.5	35	162	45.1	13.0	8.34

Method: Nutritional values

Element	Unit	Mean	Std.Dev.	CV %	N	Median	MAD	Uncertainty	Rel.Uncert. %
NDF-ash-free	g/kg	136	22.7	16.7	10	139	14.0	8.98	6.59
Total fat	g/kg	16.8	7.37	43.8	12	16.3	4.24	2.66	15.8