Erratum to: Preparation and certification of Hijiki reference material, NMIJ CRM 7405-a, from the edible marine algae hijiki (*Hizikia fusiforme*)

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Following online publication the authors regrettably found some mistakes and typographical errors in the article. The corrections are given below.

Page 1714, section “Apparatus”, the end of the first paragraph should read:

“And, He 1 mL/min + H₂ 3 mL/min was used for the measurement of Fe and He 3 mL/min + H₂ 1 mL/min was used for other elements”.

Page 1714, section “Apparatus”, the third paragraph should read:

“The typical operating parameters for the ICP-OES were as follows”

Page 1716, section “Homogeneity study”, the end of the first paragraph should read:

“The s_{bb} was theoretically calculated from MS_{within} and MS_{among} .”

Page 1716, section “Homogeneity study”, equation 1 should read:

$$u_{bb} = \sqrt{\frac{MS_{within}}{n}} \sqrt[4]{\frac{2}{vMS_{within}}}$$

The online version of the original article can be found at <http://dx.doi.org/10.1007/s00216-011-5584-0>.

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Page 1717, section “Results of homogeneity study”, the end of the second paragraph should read:

“Therefore, u_{bb} was estimated as the uncertainty for showing homogeneity for Cd and Pb, whereas for the other elements and for As(V), s_{bb} was used”.

Page 1719, right-hand column, line 6 should read:

“Hence, ultrasonic extraction with water for 1 h and microwave-assisted extraction with water for 30 min were employed as the extraction techniques for As(V) in this work”.

Page 1721, the end of the first paragraph should read:

“Therefore, As(III) had not been certified.”

Page 1721, section “Uncertainties in the certified values”, third paragraph should read:

“The uncertainty of the analytical results ($u_{anal(x)}$) was calculated as a weighted mean of uncertainties related to the measurement results listed in Table 2, and given by Eq. (2).”

Page 1721, left-hand column, equation 2 should read:

$$u_{anal}(x) = \frac{\sqrt{\sum w_i^2 u(x_i)^2}}{\sum w_i}$$

Page 1721, left-hand column, the beginning of last paragraph should read:

“A stability contribution was not included in the combined standard uncertainty because no systematic change in the concentration has been observed in the stability test up until the present time.”

There were errors in some units given in Tables 2, 3 and 4. The corrected versions are given below.

Page 1721, right-hand column, line 5 from the last sentence in the paragraph of Conclusions should read:

“It can be used for evaluating the accuracy of analytical methods and validating the measurement results of As(V) as well as for total As.”

Table 2 Analytical results for the candidate CRM

Element	Method	Mean (g/kg)	Combined standard uncertainty (g/kg)
Na	ICP-OES	16.24	0.17
	FI-AAS	16.15	0.09
	FI-Emission	16.29	0.19
K	ICP-OES	47.46	0.43
	FI-AAS	47.54	0.58
	FI-Emission	47.51	0.51
Mg	ICP-MS	6.790	0.064
	ICP-OES	6.768	0.061
	FI-AAS	6.811	0.044
Ca	ICP-MS	15.15	0.21
	ICP-OES	15.30	0.12
	FI-AAS	15.12	0.14
	FI-Emission	15.24	0.14
Sr	ICP-MS	1.472	0.020
	ID-ICP-MS	1.494	0.015
	ICP-OES	1.455	0.014
	GFAAS	1.453	0.018
P	ICP-MS	1.027	0.026
	ICP-HRMS	1.012	0.019
	ICP-OES	1.004	0.016
Element	Method	Mean (mg/kg)	Combined standard uncertainty (mg/kg)
Al	ICP-MS	150.0	1.7
	ICP-OES	145.0	1.4
	GFAAS	145.7	2.3
As	ICP-MS	35.49	0.64
	ICP-HRMS	36.39	0.27
	ICP-OES	35.70	0.71
	GFAAS	35.32	0.33
Ba	ICP-MS	14.66	0.08
	ID-ICP-MS	14.58	0.16
Cd	ICP-MS	0.785	0.010
	ID-ICP-MS	0.800	0.007
	GFAAS	0.778	0.011
Co	ICP-MS	1.09	0.01
	ICP-HRMS	1.08	0.02
	ICP-OES	1.09	0.05
	GFAAS	1.05	0.01
Cr	ICP-HRMS	3.41	0.03
	ID-ICP-MS	3.33	0.05
	ICP-OES	3.42	0.03
Cu	ICP-MS	1.51	0.02
	ID-ICP-MS	1.56	0.02
	ICP-OES	1.51	0.04
	GFAAS	1.57	0.01
Fe	ICP-MS	311.9	1.5
	ID-ICP-MS	314.5	5.8

Table 2 (continued)

Element	Method	Mean (mg/kg)	Combined standard uncertainty (mg/kg)
	ICP-OES	304.1	2.9
	GFAAS	313.9	4.2
	ICP-MS	14.33	0.12
Mn	ICP-OES	13.74	0.13
	GFAAS	14.08	0.16
	ICP-MS	2.17	0.05
Ni	ID-ICP-MS	2.25	0.03
	ICP-OES	2.22	0.04
	ICP-MS	0.423	0.009
Pb	ID-ICP-MS	0.444	0.011
	GFAAS	0.436	0.005
	ICP-MS	13.73	0.29
Zn	ID-ICP-MS	13.39	0.11
	ICP-OES	13.39	0.08
	US/HPLC-ICP-MS	9.99	0.18
As(V)	MW/HPLC-ICP-MS	10.27	0.17
	MW/IC-ICP-MS	9.92	0.18

Table 3 Uncertainty budget for the certified values of NMIJ CRM 7405-a

Element	Relative standard uncertainty (%)				Combined standard uncertainty	
	u_{std}	u_{anal}	u_{meth}	u_{hom}	u_c (Relative, %)	u_c (g/kg)
Na	0.35	0.47	0.33	0.26	0.72	0.12
K	0.35	0.61	0.11	0.26	0.75	0.36
Mg	0.35	0.47	0.28	0.41	0.77	0.05
Ca	0.35	0.47	0.61	0.74	1.12	0.17
Sr	0.17	0.55	1.12	0.74	1.47	0.02
P	0.35	1.13	0.88	0.24	1.49	0.02
						(mg/kg)
Al	0.35	0.67	1.67	1.64	2.46	3.61
As	0.35	0.57	0.71	0.74	1.23	0.44
Ba	0.29	0.53	0.29	0.57	0.88	0.13
Cd	0.35	0.66	1.25	0.21	1.48	0.01
Co	0.35	0.86	1.98	1.51	2.65	0.03
Cr	0.35	0.57	1.37	1.14	1.90	0.06
Cu	0.35	0.62	1.97	0.94	2.30	0.04
Fe	0.35	0.45	1.52	0.68	1.76	5.47
Mn	0.35	0.56	2.18	0.73	2.39	0.34
Ni	0.35	0.94	1.65	1.08	2.21	0.05
Pb	0.35	0.96	2.66	1.07	3.04	0.01
Zn	0.35	0.51	1.52	1.04	1.94	0.26
As(V)	0.84	1.00	1.47	1.20	2.30	0.23

Table 4 Certified values of NMIJ CRM 7405-a

Element	Certified value	Expanded uncertainty ($k=2$)
	Mass fraction (g/kg)	Mass fraction (g/kg)
Na	16.2	0.2
K	47.5	0.7
Mg	6.79	0.10
Ca	15.2	0.3
Sr	1.47	0.04
P	1.01	0.03
	Mass fraction (mg/kg)	Mass fraction (mg/kg)
Al	147	7
As	35.8	0.9
Ba	14.6	0.3
Cd	0.79	0.02
Co	1.07	0.06
Cr	3.4	0.1
Cu	1.55	0.07
Fe	311	11
Mn	14.1	0.7
Ni	2.2	0.1
Pb	0.43	0.03
Zn	13.4	0.5
As(V)	10.1	0.5