SHIMADZU APPLICATION NEWS

LAAN-A-IP-E001

● INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROMETRY

No.J87

Multi-Element Simultaneous Determination of Nutrients as well as Hazardous Elements in Brown Rice by ICPE-9000

Analysis of inorganic substances in plants might focus on micro-level hazardous metals besides the nutrients as analysis samples. The advantage of using an ICP emission spectrometer for such analyses is that both micro-levels and high-levels of substances can be measured simultaneously.

This Application News introduces an analysis of a brown rice sample using the Shimadzu ICPE-9000 multitype ICP emission spectrometer, in which digestion of the sample into a solution was conducted using a microwave digester.

■ Sample

Powdered brown rice standard substances
NIES No.10-a, -b, -c

■ Analytical Conditions

Instrument	: ICPE-9000
Radio Frequency Power	: 1.2 (kW)
Plasma Gas	: 10 (L/min)
Auxiliary Gas	: 0.6 (L/min)
Carrier Gas	: 0.7 (L/min)
Misting Chamber	: Cyclone Chamber
Plasma torch	: Mini Torch
View method	: Axial/Radial

■ Sample Preparation

Add nitric acid and hydrochloric acid to 0.4 g of sample, and digest the sample using a microwave sample digester. After cooling, bring the solution volume to 20 mL using distilled water, and use this as the analysis sample.

■ Analysis Results

Table 1 shows the quantitation values and certified values.
The obtained results matched the certified values closely for most of the elements.
There are 3 levels of Cd contamination in the brown rice standard substances used as analysis samples, but excellent results were obtained even with the trace-level sample.
Fig. 2 and 3 show the spectral profile and calibration curve, respectively, for Cd.

Fig.1 ICPE-9000

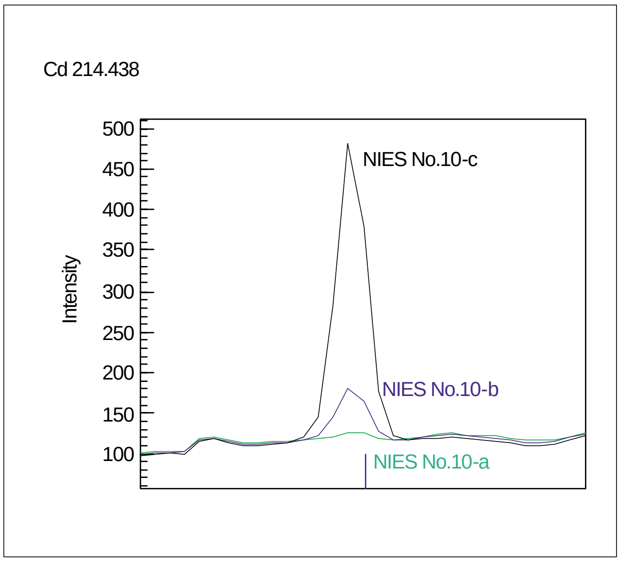

Fig. 2 Profile of Cd

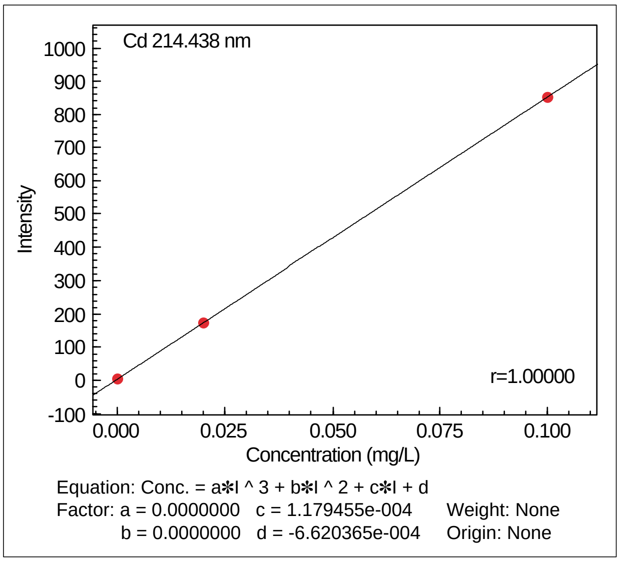

Fig. 3 Calibration Curve for Cd

Table 1 Quantitation Results **(Unit: μg/g)**

Element	NIES No.10-a		NIES No.10-b		NIES No.10-c	
	Quantiation Value	Certified Value	Quantiation Value	Certified Value	Quantiation Value	Certified Value
Al	2 .9	(3)	2 .0	(2)	1 .8	(1.5)
Ca	95	93±3	77	78±3	94	95±2
Cd	0 .02	0.023±0.003	0 .30	0.32±0.02	1 .80	1.82±0.06
Cu	3 .4	3.5±0.3	3 .2	3.3±0.2	4 .2	4.1±0.3
Cr	0 .07	(0.07)	0 .19	(0.22)	0 .09	(0.08)
Fe	12 .1	12.7±0.7	12 .6	13.4±0.9	10 .7	11.4±0.8
K	2770	2800±80	2550	2450±100	2760	2750±100
Mn	33 .4	34.7±1.8	30 .5	31.5±1.6	38 .5	40.1±2.0
Mo	0 .34	0.35±0.05	0 .44	0.42±0.05	1 .55	1.6±0.1
P	3440	3400±70	3130	3150±60	3330	3350±80
Zn	24 .6	25.2±0.8	22 .8	22.3±0.9	22 .6	23.1±0.8

* Numbers in parentheses are reference values

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