ZA3000

Analysis of In in Work Environment Air（Electrothermal Method）

INTRODUCTION: For a workplace where indium tin oxide (ITO) is being handled, a notice including the health hazard preventive measures and technical guidelines for laborers has been issued by the Ministry of Health, Labour and Welfare (Notification No. 1222-2 by the Labour Standards Bureau, Industrial Safety and Health Dept.). The concentration at which the work environment needs to be improved is 0.01 mgIn/m^3 (In 10 μg/L in sample solution) and the allowable concentration for the long-term exposure is 3 ×10^{-4} mgIn/m^3 (In 0.3 μg/L in sample solution). In the polarized zeeman electrothermal atomic absorption spectrometry, the twin injection allows a large volume injection. Thus, it is possible to quantitatively analyze In 0.3 μg/L, the level corresponds to the allowable concentration, without in-furnace concentration. The addition recovery for the extract from the work environment air was also found to be good.

ANALYTICAL CONDITIONS

Element	: In
Instrument	: ZA3000
Atomization	: GA
Wavelength	: 325.6 nm
Lamp Current	: 10.0 mA
Slit Width	: 1.3 nm
Cuvette	: Pyro D HR

MEASUREMENT PARAMETERS

Meas. Mode	: Working Curve
Signal Mode	: BKG Corrected
Curve Order	: Linear
Calculation	: Peak Height
Time Constant	: 0.1 sec
Temp. Control	: ON

GA AUTOSAMPLER

Sample Volume : 60 μL
Addition : Speed : 2

MATRIX MODIFIER

Matrix Modifier
: 100 mg/L Pd+Mg
Volume : 20 μL Order : After

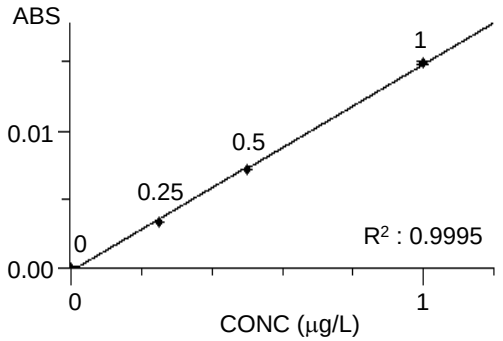
TEMPERATURE PROGRAM

Stage	Initial/Final Temperature (°C)	Heating/Keeping (sec)	Gas Flow Rate (mL/min)	Gas
1 Drying	80 / 110	40 / 0	200	Normal
	110 / 300	40 / 0	200	Normal
2 Incineration	1100 / 1100	20 / 0	200	Normal
3 Atomization	2800 / 2800	0 / 3	0	Normal
4 Cleaning	2800 / 2800	0 / 4	200	Normal

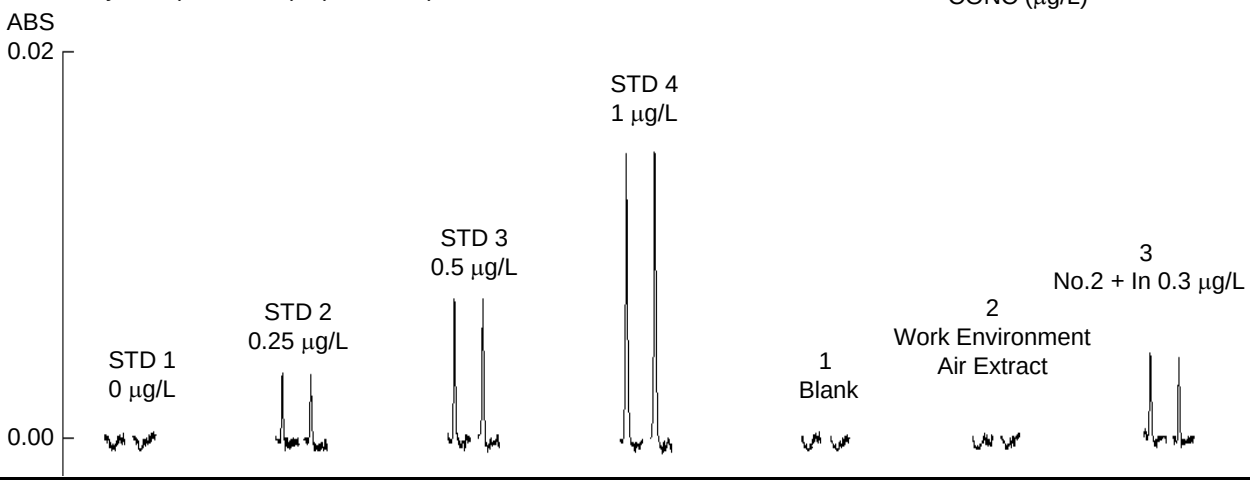
NOTE

Pyro D HR, a cuvette specially designed for twin injection, was used for the measurement.
[Preparation Method]
Inhalable dust was collected by the filter collection method at 2 L/min for 20 minutes. The dust on the filter was dissolved in 15 mL of the mixed acid for extraction (water: nitric acid: hydrochloric acid = 4 : 1: 3) and then, the volume was made up to 40 mL.

	CONC (μg/L)	Mean ABS	SD	RSD	REF
STD 1	0.00	0.0000	0.0001	− %	0.0184
STD 2	0.25	0.0033	0.0000	0.00 %	0.0206
STD 3	0.50	0.0072	0.0000	0.00 %	0.0192
STD 4	1.00	0.0149	0.0001	0.67 %	0.0206
1	0.01	0.0000	0.0000	− %	0.0182
2	0.01	0.0000	0.0000	− %	0.0178
3	0.30	0.0043	0.0002	4.65 %	0.0180



Recovery rate (No.3-No.2) : (0.30-0.01)/0.3 × 100 = 96.7 %



KEY WORDS
Environmental Analysis Related, Air, Environmental Chemistry, Air Contamination, Work Environment, Handling of ITO, etc., Indium, In, Flameless, Graphite Furnace, Twin Injection, AA, ZA3000, GA, Pyro D HR, Environment

Atomic Absorption Photometer (AA)

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