

SPECTROPHOTOMETRIC ANALYSIS

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Measurement of Metal Elements in Soft Drinks by AA-680 Atomic Absorption Spectrophotometer

What are thought of as trace metal elements in pharmaceuticals and in foods may include essential substances for the maintenance of life along with harmful components that have been taken in from environments during cultivation and growth of raw materials or that have been mixed in during the production process, and so on. Any of these harmful substances, if taken in excessively, could badly affect the human body, causing injury to health. Therefore, quality controls related to metal elements is very important. For the determination of such trace components contained in pharmaceuticals and in foods, atomic absorption spectrophotometry is effective. Shimadzu's AA-680 atomic absorption spectrophotometer features built-in automatic setting of optimum gas flow, calculation of concentration, and so on, as well as automatic setting of analytical conditions, which makes the AA-680 a more powerful instrument.

Nowadays, a great variety of soft drinks are available on the market, among which some have various kinds of vitamins and amino acids, some contain crude drugs such as from root and herb extracts that are said to be responsible for starting the boom of soft drinks. Introduced here are determinations using the AA-680 of Na, Ca and Mg, which are mixed in soft drinks and are essential elements for the human body.

• Sample Preparation

Samples were diluted without pretreatment and subjected to measurement. As no interference was observed in the measurement of Na, a straight calibration method was applied for measurement of this element. In the measurements of Ca and Mg, 2000 ppm of La was added to both samples and standards for calibration. Dilution rates used are as shown in the data.

• Analytical Conditions

Table 1 Analytical Conditions

Element	Measuring wavelength (nm)	Flame
Na	589.0	Air-C ₂ H ₂
Ca	422.7	Air-C ₂ H ₂
Mg	285.2	Air-C ₂ H ₂

Figs. 1, 3, 5 show measurement data of respective elements. Final results of measurements are shown in Figs. 2, 4, 6. ACTUAL CONC represents actually measured concentration, and W, M, and L represent sample amount acquired, dilution rate, and constant volume respectively. In the measurements introduced here, samples were diluted only, so W and L were both set to 1, and M represents the dilution rate.

■ Measurement of Na

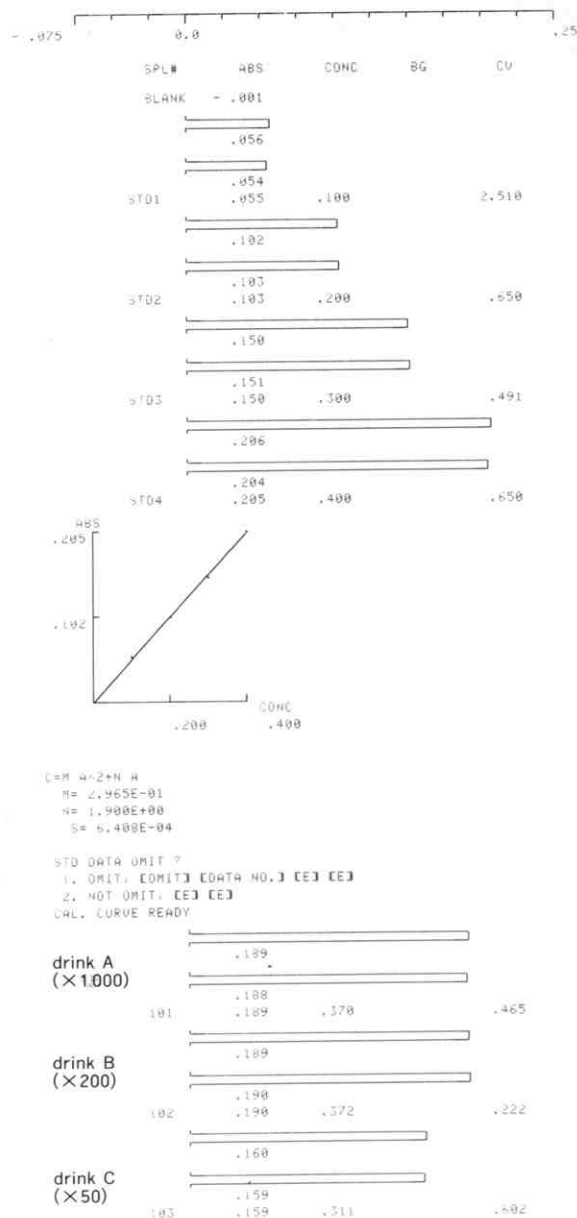


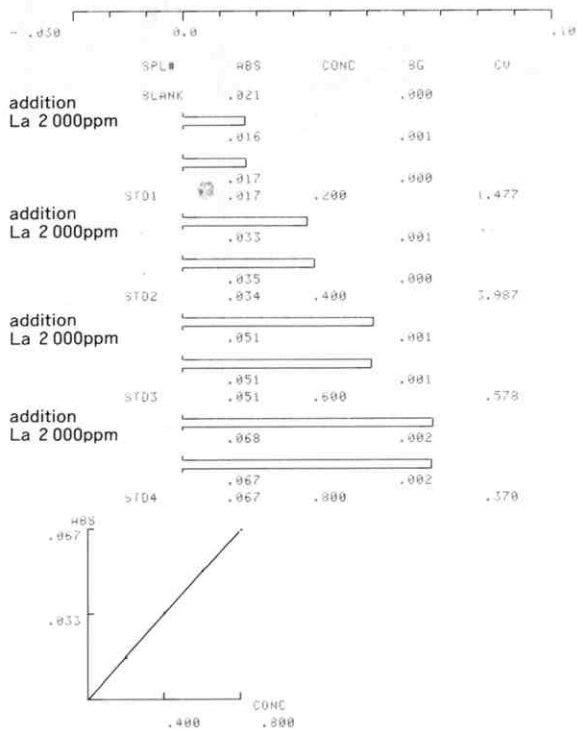
Fig. 1 Measurement of Na

■ Sample Concentration of Na

SPL#	ABS	CONC	W	M	L	ACTUAL CONC
01	0.189	0.3704 PPM	1	1000	1	370.42 PPM
02	0.190	0.3724 PPM	1	200	1	74.484 PPM
03	0.159	0.3116 PPM	1	50	1	15.579 PPM

Fig. 2 Analytical Result for Na

Measurement of Ca



LEM A=2+N A
M= 6.854E+00
N= 1.129E+01
S= 6.270E-05

STD DATA OMIT ?
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2. NOT OMIT: [E] [E]
CAL. CURVE READY

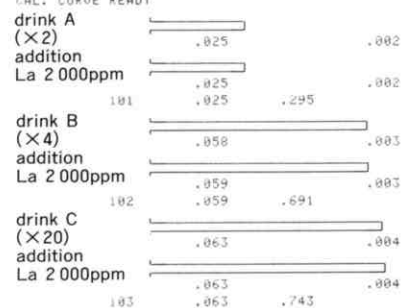
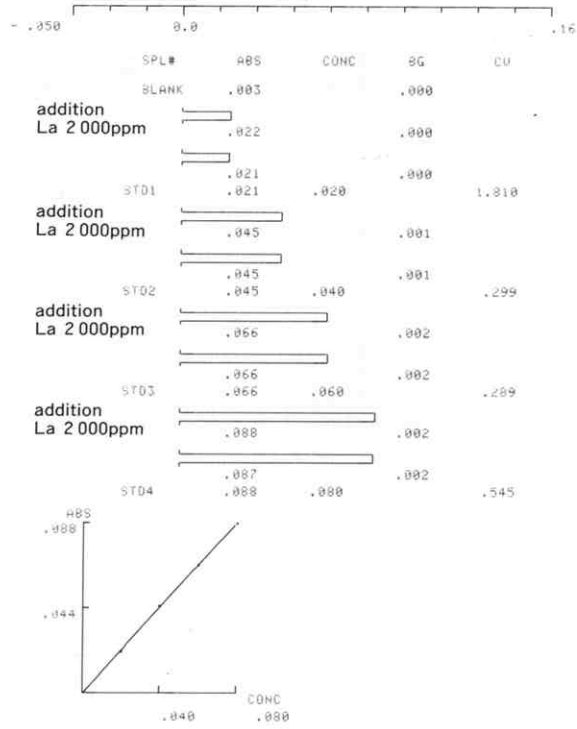


Fig. 3 Measurement of Ca

Measurement of Mg



LEM A=2+N A
M= 3.886E-01
N= 8.727E-01
S= 1.352E-04

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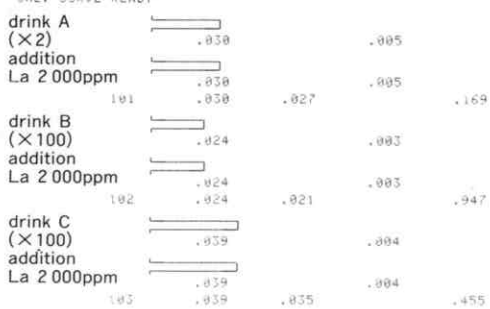


Fig. 5 Measurement of Mg

Sample Concentration of Ca

SPL#	ABS	CONC	DATE	TIME	ACTUAL CONC
101	0.025	0.2953 PPM	88.10.26	15:12:40	0.5907 PPM
102	0.059	0.5913 PPM			2.7652 PPM
103	0.063	0.7438 PPM			14.976 PPM

Fig. 4 Analytical Result of Ca

Sample Concentration of Mg

SPL#	ABS	CONC	DATE	TIME	ACTUAL CONC
101	0.030	0.0273 PPM	88.10.27	10:10:12	0.0546 PPM
102	0.024	0.0213 PPM			2.1309 PPM
103	0.039	0.0352 PPM			3.5225 PPM

Fig. 6 Analytical Result of Mg



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