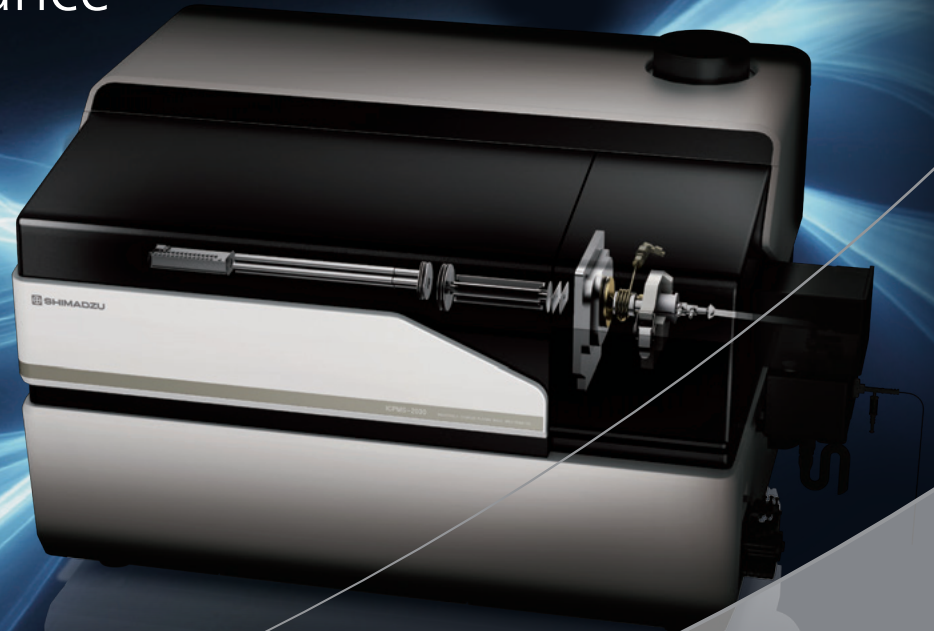


Accelerating Reliable Performance



Shimadzu ICPMS-2030 Inductively Coupled Plasma Mass Spectrometer

Quantitation of Trace Elements in Blood Using Shimadzu ICPMS-2030 Inductively Coupled Plasma Mass Spectrometer

- ▶ A newly developed collision cell provides high sensitivity and low interference.
- ▶ A unique system developed by Shimadzu results in the industry's lowest running costs*.

*As of February 2016, based data obtained by Shimadzu

Quantitation of Trace Elements in Blood Using the ICPMS-2030

The quantitation of toxic metals in biological samples such as blood and urine is necessary for assessing the exposure of humans and other animals to such metals through the natural environment, including consumption of metal-laden foods and drinks. An ICP-MS system is able to quickly measure trace quantities of toxic metals with high sensitivity. The quantitation of trace elements in blood performed with the ICPMS-2030 is shown in this report.

Sample

Blood Sample: Seronorm Trace Elements Whole Blood L-1

Sample Pretreatment and Measurement Procedures

About 50 μL of sample was put in a 7 mL TFM insert. 0.5 mL of concentrated nitric acid was added to the TFM insert. Then the sample was decomposed using ETHOS-TC microwave oven digestion system (Milestone). After the decomposition, pure water was added to the TFM insert to make 5 mL of the sample solution. XSTC-622 (SPEX) and a 1000 $\mu\text{g/mL}$ mercury solution (Wako)

were diluted with 0.14 M nitric acid solution to make the standard samples for obtaining the calibration curves. The concentrations of As, Cd, Pb, Mn, Hg and Se in the sample solution were determined by the calibration curve method (internal standard method). The measurement results are shown in table 1 and are less than the analytical values. Figure 1 shows the calibration curves of As, Cd and Pb.



| System Configuration | | Measurement Conditions | |
|----------------------|--|------------------------|--------------------------------|
| ▶ ICPMS-2030 |  | RF Power | 1.2 kW |
| ▶ AS-10 Autosampler |  | Plasma Gas Flow Rate | 8.0 L/min |
| | | Aux. Gas Flow Rate | 1.10 L/min |
| | | Carrier Gas Flow Rate | 0.70 L/min |
| | | Sample Introduction | Nebulizer 07 |
| | | Spray Chamber | Electronically-cooled cyclonic |
| | | Torch | Shimadzu mini-torch |
| | | Collision Gas | He |

Table 1 Measurement Results for Trace Elements in Blood

| Measured Element | As | Cd | Pb | Mn | Hg | Se |
|--|-----|------|------|------|------|----|
| Mass Number | 75 | 111 | 208 | 55 | 202 | 78 |
| Analytical Value ($\mu\text{g/L}$) | 2.4 | 0.36 | 10.2 | 20.7 | 1.50 | 59 |
| Analytical Uncertainty ($\mu\text{g/L}$) | 0.5 | 0.02 | 2.1 | 4.2 | 0.30 | 12 |
| Quantitation Value ($\mu\text{g/L}$) | 2.2 | 0.35 | 8.7 | 20.2 | 1.5 | 68 |

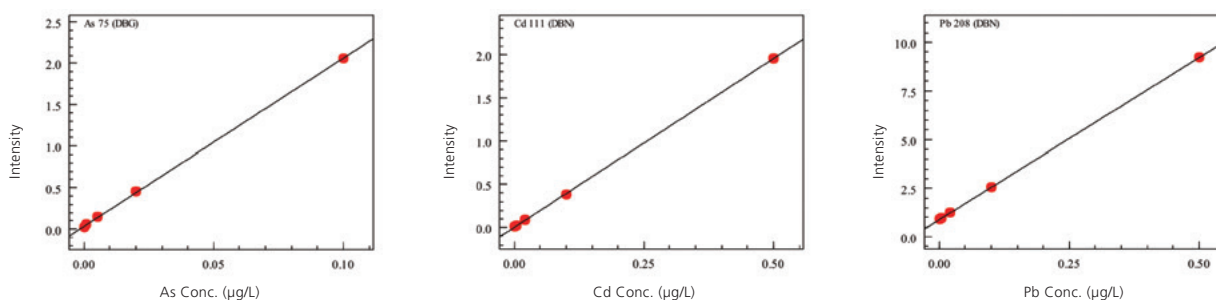


Fig. 1 Calibration Curves for As, Cd and Pb

Note: This analytical system may be used for research applications, and may not be used for clinical diagnosis.



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