C113-E021

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Shimadzu ICPMS-2030 Inductively Coupled Plasma Mass Spectrometer

# Quantitation of Trace Elements in Beer 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 Beer Using the ICPMS-2030

■ Raw materials and the brewing process affect the concentrations and speciation of trace elements included in beer. Such trace elements can have a significant effect on the taste, color, shelf-life, and the safety of beer.
The ICPMS-2030 allows the precise measurement of the trace elements in beer at low cost.

## ■ Sample Pretreatment and Measurement Procedures

Two kinds of undiluted commercial beer were measured with the ICPMS-2030 after they were degassed. The concentrations of Ni, Cd, Sb and Pb in the undiluted beer were determined by the calibration curve method (internal standard method). Figure 1 shows the calibration curve of Pb.

### System Configuration

▶ **ICPMS-2030**

▶ **AS-10 Autosampler**

### Measurement Conditions

| | |
|---|---|
| RF Power | 1.2 kW |
| Plasma Gas Flow Rate | 8.0 L/min |
| Aux.Gas Flow Rate | 1.10 L/min |
| Carrier Gas Flow Rate | 0.65 L/min |
| Sample Introduction | Nebulizer 07 |
| Spray Chamber | Electronically-cooled Cyclonic |
| Torch | Shimadzu mini-torch |
| Collision Gas | He |
| Conc. of Standards | 0, 2, 5, 10 µg/L (in 5% EtOH) |
| Internal Standards | 10 µg/L Ga, In, Tl |

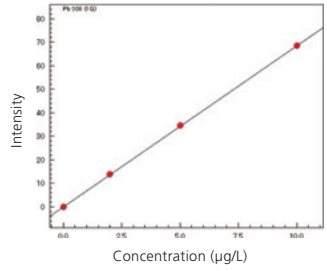



Fig.1 Calibration Curve for Pb

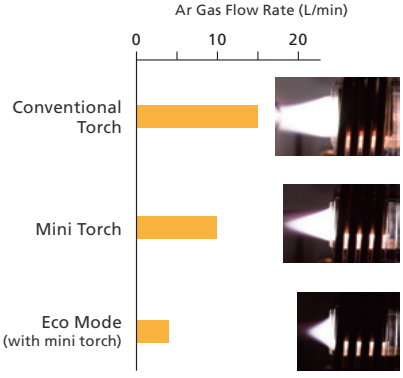
## ■ Measurement Results

Table 1 shows the measurement results. The collision cell provides high sensitivity and low interference, the detection limit of the ICPMS-2030 for Ni, Cd, Sb and Pb is much lower than their concentrations in the beer obtained by the measurement. The additional recovery for each element is within 10% of deviation.

Table 1 Measurement Results for Trace Elements in Beer

| Measured Element | Ni | Cd | Sb | Pb |
|---|---|---|---|---|
| Mass Number | 60 | 111 | 121 | 208 |
| Detection Limit (3σ) (µg/L) | 0.007 | 0.002 | 0.0006 | 0.0004 |
| | | | | |
| Beer 1 (µg/L) | 4.4 | 0.051 | 0.16 | 0.15 |
| Beer 2 (µg/L) | 1.8 | 0.007 | 0.23 | 0.095 |
| Additional Recovery (%) | 107 | 101 | 108 | 101 |

■ Shimadzu's proprietary mini-torch plasma system significantly reduces running cost by reducing argon gas consumption and using lower-purity argon gas.




1. Unique combination of mini-torch and eco mode developed by Shimadzu reduces consumption of argon by 50% compared with a conventional torch.
   * Mini-torch Plasma Unit : 10 L/min during measurement (Conventional 18 L/min)
   * Eco Mode: 5 L/min during standby

2. Compatible with low-purity (99.95%) argon
   * Expensive, high-purity (≥99.999%) argon no longer necessary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