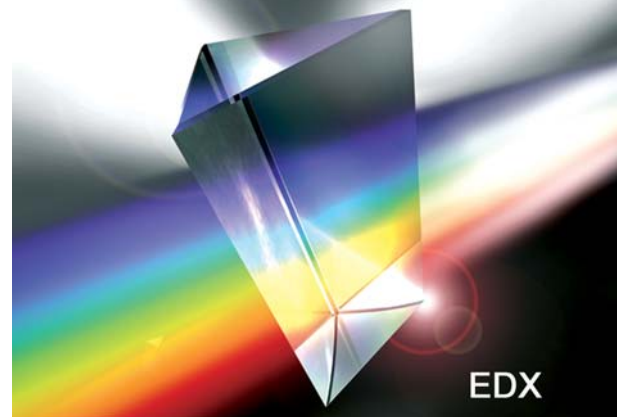


Application Note

EDXRF Analysis of Lead and Cadmium in Aluminum Alloy

Field: Electrical and electronic equipment, Environmental, Recycling



Restriction of Hazardous Substance (RoHS) will be implemented in European Union (EU) as environmental efforts. In this situation, it is getting more important to measure the hazardous elements in electrical and electronic equipments. EDXRF is getting used for screening method generally because EDXRF can measure various sample states (solid, powder, liquid and so on) as nondestructive and rapid analysis

technique. In this report, the sensitivity and repeatability of each hazardous element are performed by EDX-720 using brass, which used as plate in aviation or vehicle industry.

<Features of EDX-720>

The sensitivity of hazardous elements such as chromium, Mercury, Bromine, Lead and Cadmium improves more than 2 times higher adopting new type of filters and high counting rate systems.

■ Sample

Aluminum alloy sample included Pb and Cd made by Sumitomo Metal Technology Inc.

Sample	Concentration (ppm)	
	Pb	Cd
GAL1	70	10
GAL2	900	90
GAL3	200	20
GAL4	100	40
GAL5	1160	180
GAL6	540	140

Above concentration value is calibrated by ICP/MS.



■ Result - Lower Limits of Detection -

Element	Pb (La)	Pb (Lb1)	Cd (Ka)
Voltage (kV)	50	50	50
Current (uA)	440	440	1000
Measurement time (sec.)	300	300	300
L.L.D. (ppm)	3.7	3.3	2.2

- The measurement conditions of each element are optimized.
- The calculation of Lower Limits of Detection (L.L.D.) is used below formula.

*The formula of L.L.D.

$$L.L.D. = 3 \times k \times \sqrt{\frac{I_{back}}{T}}$$

k Calibration curve constant
I_{back} Background intensity
T Measurement time

■ Result - Calibration Curve -

The calibration curves of each element are shown in Fig.1 to Fig.3.

Fig.1 Calibration curve for Pb-La

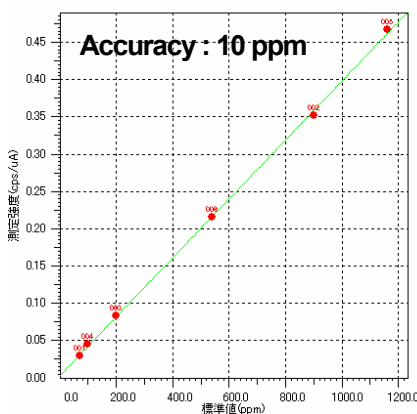


Fig.2 Calibration curve for Pb-Lb1

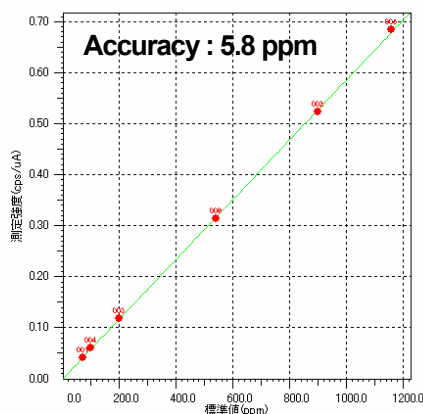
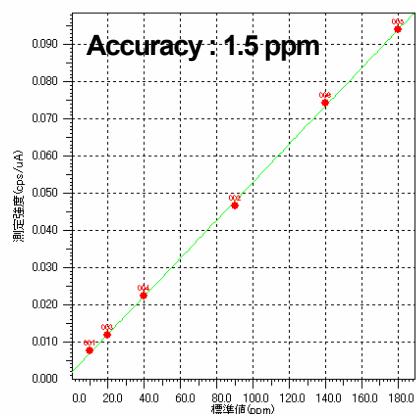


Fig.3 Calibration curve for Cd-Ka



■ Result - Repeatability Test -

Using the Aluminium alloy sample (GAL4) measures the 10 times repeatability test.

Element	Pb (La)	Pb (Lb1)	Cd (Ka)
Standard value (ppm)	100		40
Quantitative value (ppm) as average	106.1	106.1	42.7
Standard Deviation (ppm)	2.5	0.9	0.7
Practical CV(%)	2.4	0.9	1.7
Theoretical CV(%)	1.3	1.1	1.2

*Standard value is calibrated by ICP/MS.

■ Analytical Conditions

Instrument	: EDX-720
X-ray Tube	: Rh target
Filter	: New Filter #1 (for Pb), New Filter #2 (for Cd)
Voltage - Current	: 50 kV - (Auto)μA
Atmosphere	: Air
Measurement Diameter	: 10 mmφ
Measurement Time	: 300 sec
Dead Time	: 40 %

The given specifications serve purely as technical information for the user. No guarantee is given on technical specification of the described product and/or procedures.