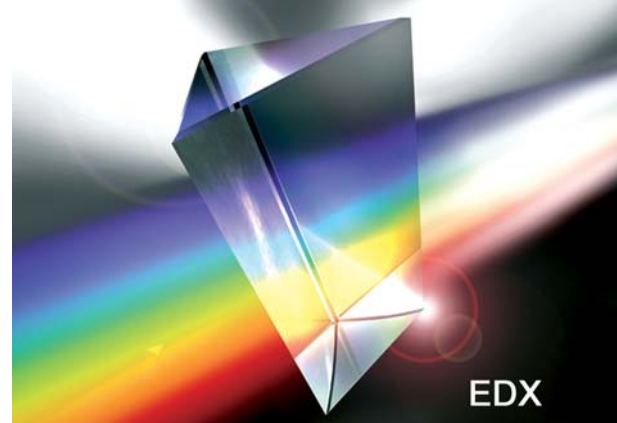


Application Note

EDXRF Analysis of Lead in Lead-Free Solder Materials

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 lead-free solder, which used for high mounting circuit board.

<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

Lead-free solder samples included Pb made by MBH ANALYTICAL LTD.

Sample	Concentration(ppm)
	Pb
74X-E	262
74X-HN	820
74X-TC	1830
74X-AM	1740
74X-HA	250
74X-HB	590



Above concentration value is calibrated by ICP/MS.

■ Result - Lower Limits of Detection -

Element	Pb (Lb1)
Voltage (kV)	30
Current (uA)	1000
Measurement time (sec.)	300
L.L.D. (ppm)	24.8

- 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 Pb-Lb1 is shown in Fig.1.

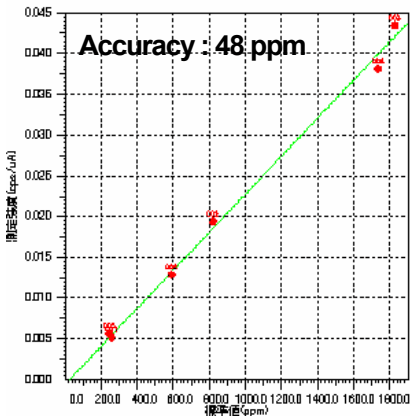


Fig.1 Calibration curve for Pb-Lb1

■ **Result - Repeatability Test -**

Using the lead-free solder sample (74X-E) measures the 10 times repeatability test.

Element	Pb (Lb1)
Standard value (ppm)	262
Quantitative value (ppm) as average	259.3
Standard Deviation (ppm)	7.4
Practical CV(%)	2.9
Theoretical CV(%)	2.5

*Standard value is calibrated by ICP/MS.

■ **Analytical Conditions**

- Instrument : EDX-720
- X-ray Tube : Rh target
- Filter : New Filter #1 (for Pb)
- Voltage - Current : 30kV - (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.