Optech Solutions

The ISO 9001:2008 international quality certification system is adopted by our company

TO BE A WORLD-LEADING ANALYTICAL TESTING SOLUTIONS PROVIDER

• Spectroscopy • Chromatography • Mass Spectrometry

EDX1800B

X-ray Fluorescence Spectrometer

RoHS Testing | Full-elemant Analysis for minerals | Plating Thickness Testing | Precious Metals Testing

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EDX1800B X-ray Fluorescence Spectrometer

Rapid | Accurate | Non-destructive

Instrument Introduction:

With the widespread of EDX1800B over different fields, we design this type to meet the need of optimizing the product performance and improve the safety protection grade.

The reliability of the product is improved by using the high voltage source and X-ray tube of the new generation and the testing efficiency is improved by the adopting the high power of X-ray tube.

Testing 75 kinds of elements, 1ppm limit of detection, Repeatability 0.1%, Stability 0.1%

RoHS

Application fields:

- RoHS testing
- Mining and alloy (Cu, stainless steel and so on) componential analysis
- Measurement of plating thickness, measurement of electroplate liquid and plating content
- The content test of precious metal such as gold, platinum and silver and different kinds of jewelry
- Mainly applied in RoHS directive industries, precious metals and jewelries processing industries; banks, jewelry shops and test institutes; electroplating industries

Performance advantages:

Down-side X-ray Source: meet the test requirements of samples of different kinds and shapes

Collimator and filter: the Auto-switch between various collimators and filters to meet the application of different testing methods

Movable platform: sophisticated manual movable platform is convenient for locating test point

High-resolution detector: improve the analyzing accuracy

High voltage source and X-ray tube of the new generation: the performance is stable and reliable, achieving higher test efficiency

Streamlined man-machine design, promising your operation security

Operation indicator makes you operate comfortably

Technical specifications:

Measurable elements: S to U.

Limit of detection (LOD) reaches 1ppm.

Element content: ppm to 99.99%

Arbitrary optional analysis and identification models

Independent matrix effect correction models

Multi-variable non-linear regression procedure

Excellent repeatability: 0.1%

Long-time working stability: 0.1%

Ambient temperature: 15℃ to 30℃

Power supply: AC 220V±5V, AC purified stabilized voltage power supply.

Energy resolution: 160±5eV

Sample chamber size: 439mm×300mm×50mm

Instrument size: 550mm×410mm×320mm

Instrument weight: 45kg

Standard configurations:

Movable sample platform

Signal-to-Noise Enhancer (SNE)

Electric-cooling Si-PIN detector

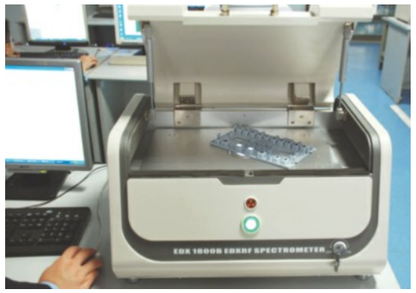
Signal detection electronic circuit

High and low voltage power

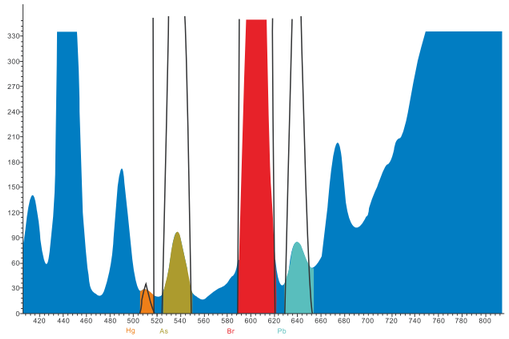
X-ray tube of high power

Computer and ink-jet printer

Test cases:

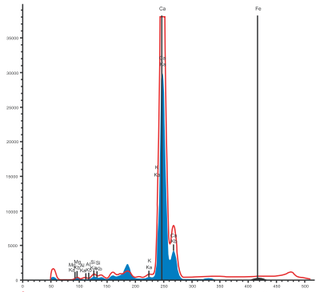


RoHS Testing

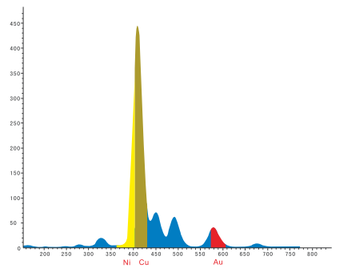


Test Results Spectrum

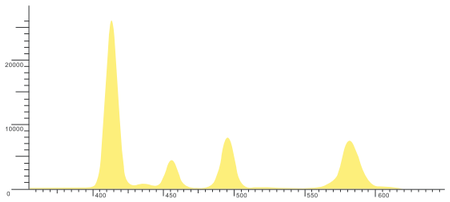
Mining Testing



Plating Thickness Testing



Precious Metals Testing



What are RoHS and WEEE Directives?

The European Union has adopted Directive 2002/95/EC on the restriction of certain hazardous substances (RoHS) and Directive 2002/95/EC on waste electrical and electronic equipment (WEEE) with their publication in the Official Journal of the European Union on February 13, 2003. WEEE comes into effect on August 13, 2005 and RoHS requires the substitution of various heavy metals (lead, mercury, cadmium and hexavalent chromium) and brominated flame retardants (polybrominated biphenyls [PBB] or polybrominated diphenyl ethers [PBDE]) in new electrical and electronic equipment put on the market from July 1, 2006.

Testing standard of substances restricted by RoHS Directive

Hazardous substances	Standards (mg/kg)
Cd	100
Pb	1000
Hg	1000
Cr^{6+}	1000
PBBs	1000
PBDEs	1000

Restricted substances and their typical uses

Pb	
Solders	
Paints	Pigments and driers
Glass materials	Pb is allowed in fluorescent lamp
Ceramic materials	Pb is allowed in certain electronic ceramic materials
Iron, aluminum and copper materials	A certain amount of Pb is allowed
Plastics	PVC stabilizer and pigments
Batteries	Pb is allowed in acidic batteries for vehicles

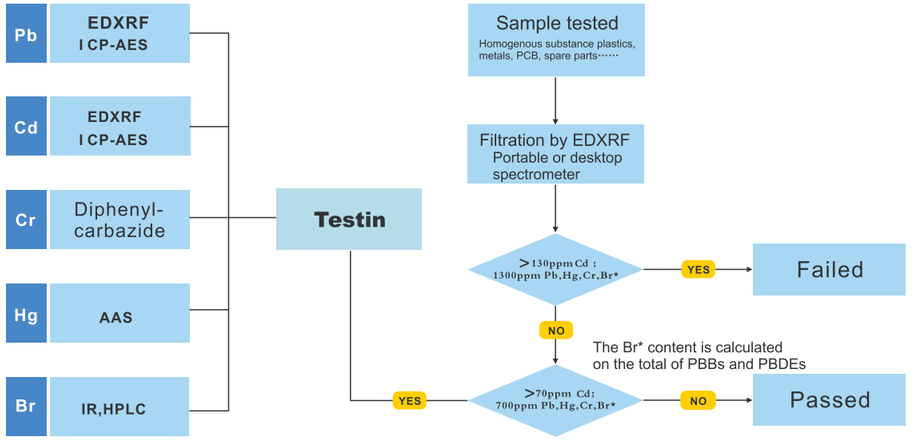
Cd	
Plastics	Stabilizer and pigments
Solders	Seldom used
Ceramics	Seldom used
Connectors	Relays and switches
Batteries	Cd is allowed in Ni-Cd batteries
Semiconductors	Optical sensors and solar cell panels

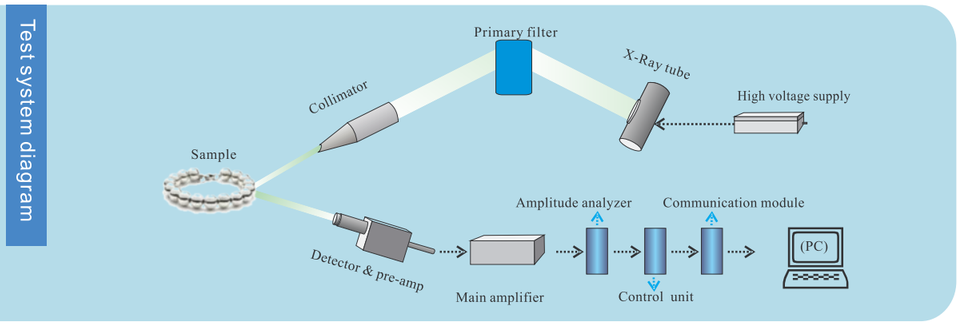
Hg	
Batteries	Prohibited (see battery directive)
Connectors	Relays and sensitive switches
Fluorescent lamps	A certain amount of Hg is allowed

Cr^{6+}	
Passivation layers	Commonly used for naked metal surfaces to enhance adhesion of plating layers
Anti-corrosive plating layers	Painting and plating layers
Chrome plating layers	Plating layer of chromium metal is not under control
Plasticizer	Commonly used to plastics plating process but not final products

PBBs & PBDEs	
Plastics	Brominated flame retardants

The analytical method of filtration for XRF to test RoHS substances





Characteristic X-radiation of element

Each element will emit X-ray at its own energy level when excited. This X-ray is characteristic and called X-ray fluorescence. It is the foundation of analysis.

Scattering

It is the background of spectrum.

Photoelement

The photoelectron is the foundation of detector. In the sample, the X-ray intensity of every element is expressed as I1,I2,I3,I4,I5 …… respectively. The element content C is the function of X-ray fluorescence intensity I, expressed as follows:

$$C=f(I_1,I_2,I_3,I_4,I_5\cdots\cdots)$$

This equation is too complicated and can be simplified as:

$$C=K_1I_1+K_2I_2+K_3I_3+K_4I_4+K_5I_5\cdots\cdots$$

Where

C is the element content in the sample; I1,I2,I3,I4,I5 …… are X-ray intensity of element respectively; K1,K2, K3,K4,K5 …… are coefficients which can be determined by measuring known standard sample to calibrate.

PERIODIC TABLE OF ELEMENTS

	IA												IIIA	IVA	VA	VIA	VIIA	0
1	1 H 氢 Hydrogen 1.008	IIA																2 He 氦 Helium 4.008
2	3 Li 锂 Lithium 6.94 0.052	4 Be 铍 Beryllium 9.012 0.110											5 B 硼 Boron 10.81 0.185	6 C 碳 Carbon 12.01 0.282	7 N 氮 Nitrogen 14.01 0.392	8 O 氧 Oxygen 15.99 0.523	9 F 氟 Flourine 18.99 0.677	10 Ne 氖 Neon 20.17 0.861
3	11 Na 钠 Sodium 22.99 1.041	12 Mg 镁 Magnesium 24.31 1.254	IIIB	IVB	VB	VIB	VIIB	VIII			IB	IIB	13 Al 铝 Aluminum 26.99 1.487	14 Si 硅 Silicon 28.09 1.740 1.838	15 P 磷 Phosphorus 30.97 2.015 2.142	16 S 硫 Sulphur 32.06 2.307 2.468	17 Cl 氯 Chlorine 35.45 2.622 2.817	18 Ar 氩 Argon 39.94 2.957 3.191
4	19 K 钾 Potassium 39.1 3.31 3.589	20 Ca 钙 Calcium 40.08 3.690 4.012 0.341 0.344	21 Sc 钪 Scandium 44.96 4.088 4.459 0.395 0.399	22 Ti 钛 Titanium 47.90 4.508 4.931 0.452 0.458	23 V 钒 Vanadium 60.94 4.949 5.427 0.51 0.519	24 Cr 铬 Chromium 51.99 5.411 5.947 0.571 0.581	25 Mn 锰 Manganese 54.94 5.895 6.492 0.636 0.647	26 Fe 铁 Iron 55.84 6.400 7.059 0.704 0.717	27 Co 钴 Cobalt 58.93 6.925 7.649 0.775 0.790	28 Ni 镍 Nickel 58.7 7.472 8.265 0.849 0.866	29 Cu 铜 Copper 63.54 8.041 8.907 0.928 0.948	30 Zn 锌 Zinc 65.38 8.631 9.572 1.009 1.032	31 Ga 镓 Gallium 69.72 9.243 10.26 1.096 1.122	32 Ge 锗 Germanium 72.5 9.876 10.98 1.186 1.216	33 As 砷 Arsenic 74.92 10.53 11.73 1.282 1.317	34 Se 硒 Selenium 78.9 11.21 12.50 1.379 1.419	35 Br 溴 Bromine 79.80 11.91 13.29 1.48 1.526	36 Kr 氪 Krypton 83.8 12.63 14.12 1.587 1.638
5	37 Rb 铷 Rubidium 85.47 13.38 14.97 1.694 1.752	38 Sr 锶 Strontium 87.82 14.14 15.85 1.806 1.872	39 Y 钇 Yttrium 88.91 14.93 16.75 1.922 1.996	40 Zr 锆 Zirconium 91.22 15.75 17.69 2.042 2.124 2.302 1.792	41 Nb 铌 Niobium 92.91 16.58 18.65 2.166 2.257 2.462 1.902	42 Mo 钼 Molybdenum 95.94 17.44 19.63 2.293 2.395 2.623 2.015	43 Tc 锝# Technetium (99) 18.33 20.65 2.424 2.538 2.792 2.122	44 Ru 钌 Ruthenium 101.0 19.24 21.69 2.558 2.683 2.964 2.252	45 Rh 铑 Rhodium 102.9 20.17 22.76 2.696 2.834 3.144 2.376	46 Pd 钯 Palladium 106.4 21.12 23.86 2.838 2.990 3.328 2.503	47 Ag 银 Silver 107.9 22.10 24.99 2.984 3.151 3.519 2.633	48 Cd 镉 Cadmium 112.4 23.11 26.14 3.133 3.316 3.716 2.767	49 In 铟 Indium 114.8 24.14 27.38 3.287 3.487 3.92 2.904	50 Sn 锡 Tin 118.6 25.19 28.60 3.444 3.662 4.131 3.044	51 Sb 锑 Antimony 121.7 26.27 29.85 3.605 3.843 4.347 3.188	52 Te 碲 Tellurium 127.6 27.38 31.13 3.769 4.029 4.570 3.335	53 I 碘 Iodine 126.9 28.51 32.44 3.937 4.220 4.800 3.484	54 Xe 氙 Xenon 131.3 29.67 33.78 4.111 4.422 5.036 3.636
6	55 Cs 铯 Cesium 137.3 30.85 35.15 4.286 4.620 5.200 3.794	56 Ba 钡 Barium 137.3 32.07 36.55 4.467 4.828 5.531 3.953	Ln 镧系	72 Hf 铪 Hafnium 178.4 55.38 63.56 7.898 9.021 10.51 6.958	73 Ta 钽 Tantalum 180.9 57.11 65.56 8.145 9.341 10.81 7.172	74 W 钨 Tungsten 183.8 58.86 67.59 8.396 9.670 11.28 7.386	75 Re 铼 Rhenium 186.2 60.66 69.66 8.651 10.01 11.68 7.602	76 Os 锇 Osmium 190.2 62.48 71.78 8.910 10.35 12.09 7.821	77 Ir 铱 Iridium 192.2 64.35 73.93 9.173 10.71 12.51 8.040	78 Pt 铂 Platinum 195.0 66.25 76.13 9.441 11.07 12.94 8.267	79 Au 金 Gold 197.0 68.19 78.37 9.711 11.44 13.38 8.493	80 Hg 汞 Mercury 200.5 70.16 80.66 9.987 11.82 13.82 8.720	81 Tl 铊 Thallium 204.3 72.18 82.99 10.27 12.21 14.28 8.952	82 Pb 铅 Lead 207.2 74.23 85.36 10.55 12.61 14.76 9.183	83 Bi 铋 Bismuth 208.9 76.32 87.77 10.84 13.02 15.24 9.419	84 Po 钋# Polonium (209) 78.46 90.24 11.13 13.44 15.74 9.662	85 At 砹# Astatine (210) 80.64 92.75 11.42 13.87 16.25	86 Rn 氡# Radon (222) 82.86 95.32 11.72 14.32 16.77
7	87 Fr 钫# Francium (223) 82.12 97.93 12.03 14.77	88 Ra 镭# Radium 226.0 87.44 100.6 12.34 15.23 17.80 10.62	An 锕系															

碱金属 Alkali Metals　非金属 Non-Metal　过渡金属 Transitional element

卤族元素 Halogen　镧系金属 Lanthanoids　锕系金属 Actinides

碱土金属 Alkaline earth　主族金属 Main group metal　稀有气体 Rare gases

注1：#表示放射性元素(#Radioactive Elements)，*表示人造元素(*Man-made Elements)

注2：元素名称下的数字顺序依次代表：原子量、Kα、Kβ、Lα、Lβ、Lγ、Le

(All the Numbers are ordered one by one in this way: Atomic Number, Element Symbol, Atomic Weight, Kα ,Kβ ,Lα ,Lβ ,Lγ ,Le)

Ln 镧系	57 La 镧 Lanthanum 138.9 33.30 37.99 4.651 5.043 5.789 4.124	58 Ce 铈 Cerium 140.1 34.57 39.45 4.840 5.262 6.052 4.287	59 Pr 镨 Praseodymium 140.9 35.86 40.95 5.034 5.489 6.322 4.452	60 Nd 钕 Neodymium 144.2 37.19 42.48 5.230 5.722 6.602 4.632	61 Pm 钷# Promethium (147) 38.54 44.05 5.431 5.956 6.891 4.816	62 Sm 钐 Samarium 150.4 39.91 45.65 5.636 6.206 7.180 4.994	63 Eu 铕 Europium 152.0 41.32 47.28 5.846 6.456 7.478 5.176	64 Gd 钆 Gadolinium 157.2 42.76 48.95 6.059 6.714 7.778 5.361	65 Tb 铽 Terbium 158.9 44.23 50.65 6.275 6.979 8.104 5.546	66 Dy 镝 Dysprosium 162.5 45.73 52.38 6.495 7.249 8.418 5.742	67 Ho 钬 Holmium 164.9 47.26 54.16 6.720 7.528 8.748 5.942	68 Er 铒 Erbium 167.2 48.82 55.96 6.948 7.810 9.089 6.152	69 Tm 铥 Thulium 168.9 50.41 57.81 7.181 8.103 9.424 6.341
An 锕系	89 Ac 锕# Actinium (227) 89.79 103.3 12.65 15.71 18.41	90 Th 钍# Thorium (232) 92.19 106.1 12.97 16.2 18.98 11.12	91 Pa 镤# Protactinium 231.0 94.64 108.9 13.29 16.7 19.55 11.36	92 U 铀# Uranium 238.0 97.14 111.8 13.61 17.22 20.16 11.62	93 Np 镎# Neptunium (237) 99.69 114.7 13.95 17.74 20.77 11.89	94 Pu 钚# Plutonium (244) 102.3 117.7 14.28 18.28 21.40 12.12	95Am 镅# *Americium (243) 104.9 120.8 14.62 18.83 22.04 12.38	96 Cm 锔# * Curium (247) 107.7 123.9 14.96 19.39 22.69	97 Bk 锫# *Berkelium (247) 110.5 127.1 15.31 19.97 23.37	98 Cf 锎# *Californium (251) 113.3 130.4 15.66 20.56 24.06	99 Es 锿# *Einsteinium (252) 116.2 133.7 16.02 21.17 24.76	100 Fm 镄# *Fermium (257) 119.2 137.2 16.38 21.79 25.47		