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TO BE A WORLD-LEADING ANALYTICAL TESTING SOLUTIONS PROVIDER

• Spectroscopy • Chromatography • Mass Spectrometry



EDX1800B X-ray Fluorescence Spectrometer

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

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Test data in this manual, if not noted, is our company's test data.
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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

Good shielding action of X-ray tube of new generation, radiation level of X-ray is equal to that of common atmospheric environment

The performance is stable and reliable, achieving higher test efficiency

The automatic function of door sensor and high voltage lock gives you protection from all directions

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

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°C to 30°C
- 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

Streamlined man-machine design, promising your operation security

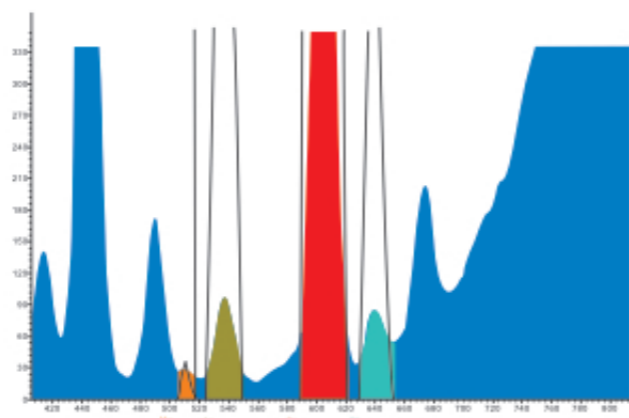
Operation indicator makes you operate comfortably



Test cases:



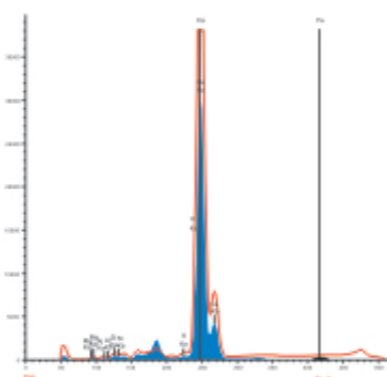
RoHS Testing



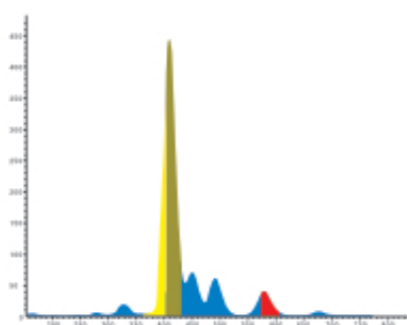
Test Results Spectrum



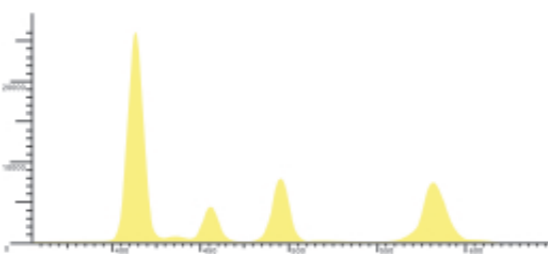
Mining Testing



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.

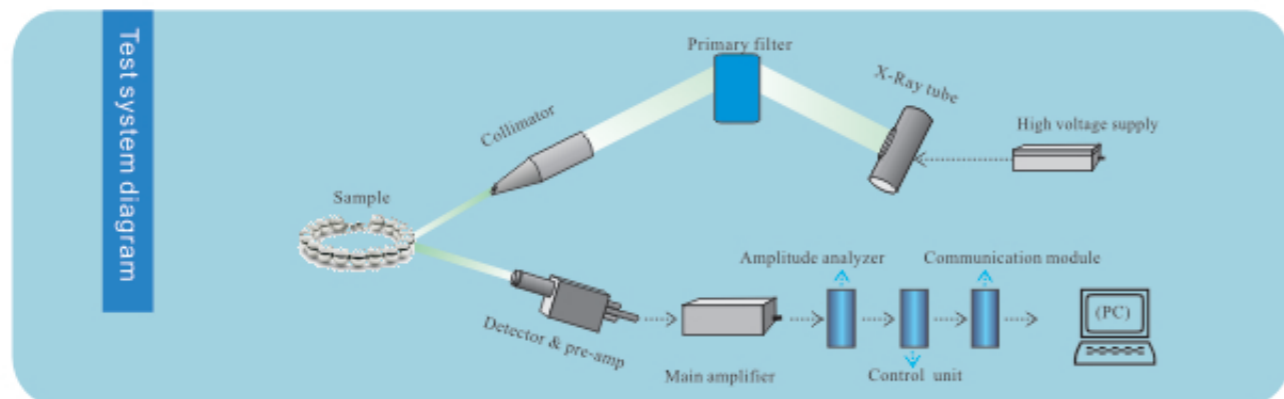
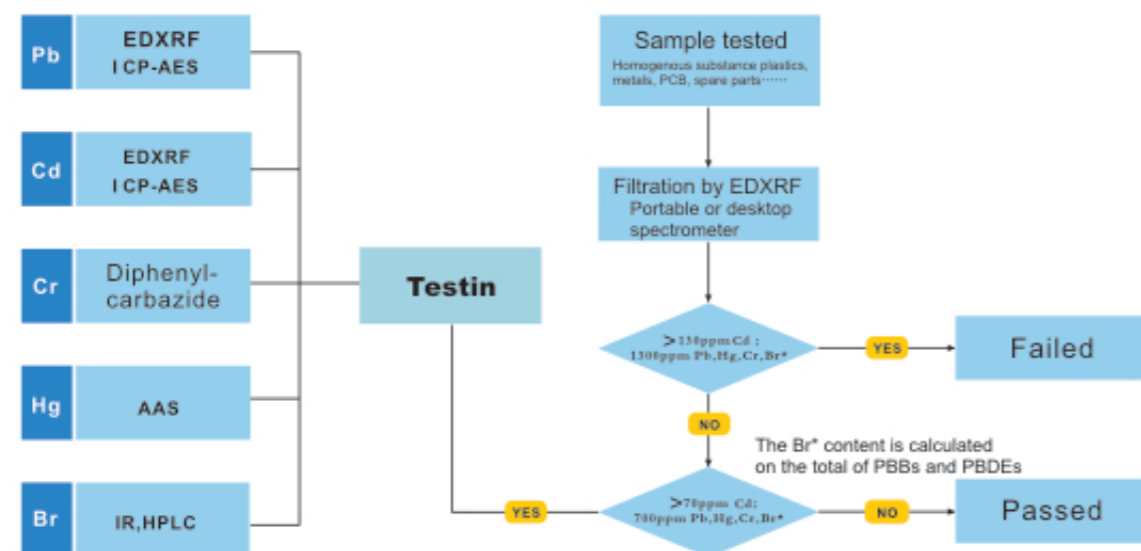
Testing standard of substances restricted by RoHS Directive

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:

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

This equation is too complicated and can be simplified as:

$$C = K_1 I_1 + K_2 I_2 + K_3 I_3 + K_4 I_4 + K_5 I_5 + \dots$$

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

(Characteristic X-Ray energy table)

Skyray Instrument

Hotline: 800-9993-800

1	IA	1 H	2 He	0
1	IA	1 H 1.008	2 He 4.008	
2	IIA	3 Li 6.94	4 Be 9.012	
2	IIA	3 Li 6.94 0.052	4 Be 9.012 0.110	
3	IIIA	11 Na 22.99	12 Mg 24.31	
3	IIIA	11 Na 22.99 1.041	12 Mg 24.31 1.254	
4	IIIA	13 Al 26.99	14 Si 28.09	
4	IIIA	13 Al 26.99 1.487	14 Si 28.09 1.703	
5	IIIA	15 P 30.97	16 S 32.07	
5	IIIA	15 P 30.97 1.875	16 S 32.07 2.132	
6	IIIA	17 Cl 35.45	18 Ar 39.94	
6	IIIA	17 Cl 35.45 2.622	18 Ar 39.94 2.957	
7	IIIA	19 K 39.1	20 Ca 40.08	
7	IIIA	19 K 39.1 3.112	20 Ca 40.08 3.690	
8	IIIA	21 Sc 44.96	22 Ti 47.88	
8	IIIA	21 Sc 44.96 3.589	22 Ti 47.88 4.012	
9	IIIA	23 V 50.94	24 Cr 51.99	
9	IIIA	23 V 50.94 3.589	24 Cr 51.99 4.012	
10	IIIA	25 Mn 54.94	26 Fe 55.85	
10	IIIA	25 Mn 54.94 3.589	26 Fe 55.85 4.012	
11	IIIA	27 Co 58.93	28 Ni 58.71	
11	IIIA	27 Co 58.93 3.589	28 Ni 58.71 4.012	
12	IIIA	29 Cu 63.55	30 Zn 65.38	
12	IIIA	29 Cu 63.55 3.589	30 Zn 65.38 4.012	
13	IIIA	31 Ga 69.72	32 Ge 72.64	
13	IIIA	31 Ga 69.72 3.589	32 Ge 72.64 4.012	
14	IIIA	33 As 74.92	34 Se 78.96	
14	IIIA	33 As 74.92 3.589	34 Se 78.96 4.012	
15	IIIA	35 Br 79.90	36 Kr 83.8	
15	IIIA	35 Br 79.90 3.589	36 Kr 83.8 4.012	
16	IIIA	37 Rb 85.47	38 Sr 87.62	
16	IIIA	37 Rb 85.47 3.589	38 Sr 87.62 4.012	
17	IIIA	39 Y 88.91	40 Zr 91.22	
17	IIIA	39 Y 88.91 3.589	40 Zr 91.22 4.012	
18	IIIA	41 Nb 92.91	42 Mo 95.94	
18	IIIA	41 Nb 92.91 3.589	42 Mo 95.94 4.012	
19	IIIA	43 Tc 98.91	44 Ru 101.1	
19	IIIA	43 Tc 98.91 3.589	44 Ru 101.1 4.012	
20	IIIA	45 Rh 102.9	46 Pd 106.4	
20	IIIA	45 Rh 102.9 3.589	46 Pd 106.4 4.012	
21	IIIA	47 Ag 107.9	48 Cd 112.4	
21	IIIA	47 Ag 107.9 3.589	48 Cd 112.4 4.012	
22	IIIA	49 In 114.8	50 Sn 118.7	
22	IIIA	49 In 114.8 3.589	50 Sn 118.7 4.012	
23	IIIA	51 Sb 121.8	52 Te 127.6	
23	IIIA	51 Sb 121.8 3.589	52 Te 127.6 4.012	
24	IIIA	53 I 126.9	54 Xe 131.3	
24	IIIA	53 I 126.9 3.589	54 Xe 131.3 4.012	
25	IIIA	55 Cs 132.9	56 Ba 137.3	
25	IIIA	55 Cs 132.9 3.589	56 Ba 137.3 4.012	
26	IIIA	57 La 138.9	58 Ce 140.1	
26	IIIA	57 La 138.9 3.589	58 Ce 140.1 4.012	
27	IIIA	59 Pr 140.9	60 Nd 144.2	
27	IIIA	59 Pr 140.9 3.589	60 Nd 144.2 4.012	
28	IIIA	61 Pm 144.9	62 Sm 150.4	
28	IIIA	61 Pm 144.9 3.589	62 Sm 150.4 4.012	
29	IIIA	63 Eu 152.0	64 Gd 157.3	
29	IIIA	63 Eu 152.0 3.589	64 Gd 157.3 4.012	
30	IIIA	65 Tb 158.9	66 Dy 162.5	
30	IIIA	65 Tb 158.9 3.589	66 Dy 162.5 4.012	
31	IIIA	67 Ho 164.9	68 Er 167.3	
31	IIIA	67 Ho 164.9 3.589	68 Er 167.3 4.012	
32	IIIA	69 Tm 168.9	70 Yb 173.0	
32	IIIA	69 Tm 168.9 3.589	70 Yb 173.0 4.012	
33	IIIA	71 Lu 175.0	72 Hf 178.5	
33	IIIA	71 Lu 175.0 3.589	72 Hf 178.5 4.012	
34	IIIA	73 Ta 180.9	74 W 183.8	
34	IIIA	73 Ta 180.9 3.589	74 W 183.8 4.012	
35	IIIA	75 Re 186.2	76 Os 190.2	
35	IIIA	75 Re 186.2 3.589	76 Os 190.2 4.012	
36	IIIA	77 Ir 192.2	78 Pt 195.1	
36	IIIA	77 Ir 192.2 3.589	78 Pt 195.1 4.012	
37	IIIA	79 Au 197.0	80 Hg 200.6	
37	IIIA	79 Au 197.0 3.589	80 Hg 200.6 4.012	
38	IIIA	81 Tl 204.4	82 Pb 207.2	
38	IIIA	81 Tl 204.4 3.589	82 Pb 207.2 4.012	
39	IIIA	83 Bi 208.98	84 Po 209	
39	IIIA	83 Bi 208.98 3.589	84 Po 209 4.012	
40	IIIA	85 At 210	86 Rn 222	
40	IIIA	85 At 210 3.589	86 Rn 222 4.012	
41	IIIA	87 Fr 223	88 Ra 226	
41	IIIA	87 Fr 223 3.589	88 Ra 226 4.012	
42	IIIA	89 Ac 227	90 Th 232	
42	IIIA	89 Ac 227 3.589	90 Th 232 4.012	
43	IIIA	91 Pa 231	92 U 238	
43	IIIA	91 Pa 231 3.589	92 U 238 4.012	
44	IIIA	93 Np 237	94 Pu 244	
44	IIIA	93 Np 237 3.589	94 Pu 244 4.012	
45	IIIA	95 Am 243	96 Cm 247	
45	IIIA	95 Am 243 3.589	96 Cm 247 4.012	
46	IIIA	97 Bk 247	98 Cf 251	
46	IIIA	97 Bk 247 3.589	98 Cf 251 4.012	
47	IIIA	99 Es 252	100 Fm 257	
47	IIIA	99 Es 252 3.589	100 Fm 257 4.012	

- Alkali Metals
- Non-Metal
- Transitional element
- Halogen
- Lanthanoids
- Actinides
- Alkaline earth
- Rare gases
- Main group metal

Mark 1: #Radioactive Elements *Man Made Elements
2: All the Numbers are ordered one by one in this way, Atomic Number
Element Symbol, Atomic Weight, K α, K β, L α, L β, L γ, L ε

Ln	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
	138.9	140.1	140.9	144.2	144.9	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0
	33.30	34.57	35.86	37.19	38.54	39.91	41.32	42.76	44.23	45.73	47.26	48.82	50.41	52.04	53.59
	37.99	39.45	40.95	42.48	44.05	45.65	47.28	48.95	50.65	52.38	54.16	55.96	57.81	59.69	61.61
4.651	4.840	5.034	5.230	5.431	5.636	5.846	6.059	6.275	6.495	6.720	6.948	7.181	7.414	7.654	
5.043	5.262	5.489	5.722	5.956	6.206	6.456	6.714	6.979	7.249	7.528	7.810	8.103	8.401	8.708	
5.789	6.052	6.322	6.602	6.891	7.180	7.478	7.778	8.104	8.418	8.748	9.089	9.424	9.779	10.14	
4.124	4.287	4.452	4.632	4.816	4.994	5.176	5.361	5.546	5.742	5.942	6.152	6.341	6.544	6.752	
An	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm			
	227	232	231	238	237	244	243	247	247	251	252	257			
	89.79	92.19	94.64	97.14	99.60	102.3	104.9	107.7	110.5	113.3	116.2	119.2			
	12.65	12.97	13.29	13.61	13.96	14.28	14.62	14.96	15.31	15.66	16.02	16.38			
15.71	16.2	16.7	17.22	17.74	18.28	18.83	19.39	19.97	20.56	21.17	21.79				
18.41	18.98	19.55	20.16	20.77	21.40	22.04	22.69	23.37	24.06	24.76	25.47				