



better analysis counts

HD Prime Analyzer

For Toys and Children's Products



For Lead and Other Toxic Elements

The HD Prime analyzer uses XOS's breakthrough **High Definition X-ray Fluorescence (HDXRF®)** technique to measure for lead and other toxic elements in toys and children's products at unprecedented detection limits.

Advances in optics and analytical technology let the HD Prime analyzer measure the concentration of these elements in the product's paint and separately in the base material. This analytical technique was developed specifically to meet the CPSIA's current and future regulatory limits. The HD Prime analyzer is ideal for the rapid screening and precise determination of toxic elements in toys in a highly user-friendly and cost-effective manner. Measurements are non-destructive and do not require costly and time-consuming sample preparation that would destroy the tested merchandise and degrade the audit trail. HDXRF® equips industry and government agencies, which are responsible for ensuring product safety, with truly unprecedented benefits of speed, precision, and ease of use.



Complies with ASTM F2853 and F2617

Application areas

- Multi-element detection in toys and children's products for compliance with regulatory requirements of the **CPSIA**.
- Rapid and precise screening and quantification of toxic elements.
- For use in factory production and lab environments, third-party test labs, retail, and regulatory applications.

Features and benefits

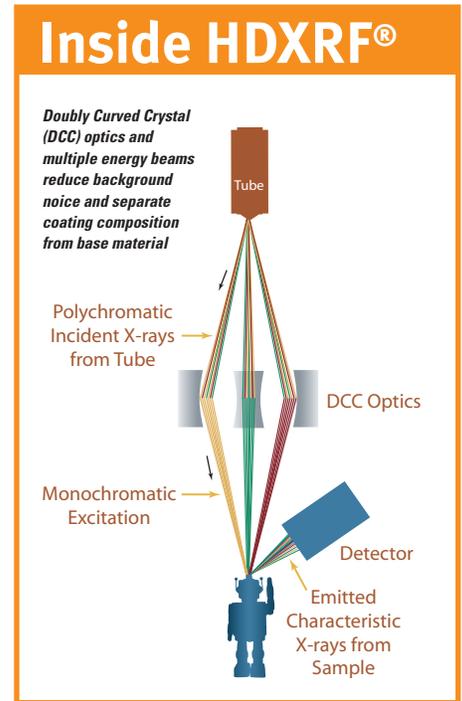
- Determination of regulated elements (Pb, Sb, As, Ba, Cd, Cr, Hg, Se, Br, and Cl).
- The concentration of the toxic elements in the **paint** and the base materials are both reported **separately**.
- Analysis area of 1mm; enables testing of small features and irregular shapes.
- Ease of use enables testing in factory and laboratory environments with minimal training.
- No sample preparation required: eliminates time-consuming paint removal and digestion steps, is nondestructive to the product, and won't degrade the audit trail.
- Screening mode rapidly detects the presence of all relevant toxic elements.
- Quantification mode precisely and accurately determines the concentration of elements in the paint and the substrate.

Powered by

HDXRF®

The Right Technology Matters

HDXRF® is an elemental analysis technique which uses XOS's patented DCC optics to enhance measurement precision and accuracy. An important benefit of HDXRF® is that it provides elemental quantification in the coating and substrate separately. Multiple DCC optics capture x-rays from a divergent x-ray beam emitted from the tube, and the optics redirect several select and narrow energy regions into an intense and focused beam on the surface of the product. By selectively using multiple monochromatic-excitation beams ranging from low to high energy, HDXRF® allows the user to quantify toxic element concentrations for both the coating and the base materials **separately**. Using multiple **monochromatic excitation**, HDXRF® eliminates the scattering background under the fluorescence peaks, greatly enhancing elemental detection limits. Since this technique applies focused excitation beams, an analysis area on the sample of 1 mm diameter is achieved without reducing the analyzer's sensitivity by using collimators to reduce the beam size. The diagram shows the basic configuration of HDXRF® and its use of multiple monochromatic excitation.



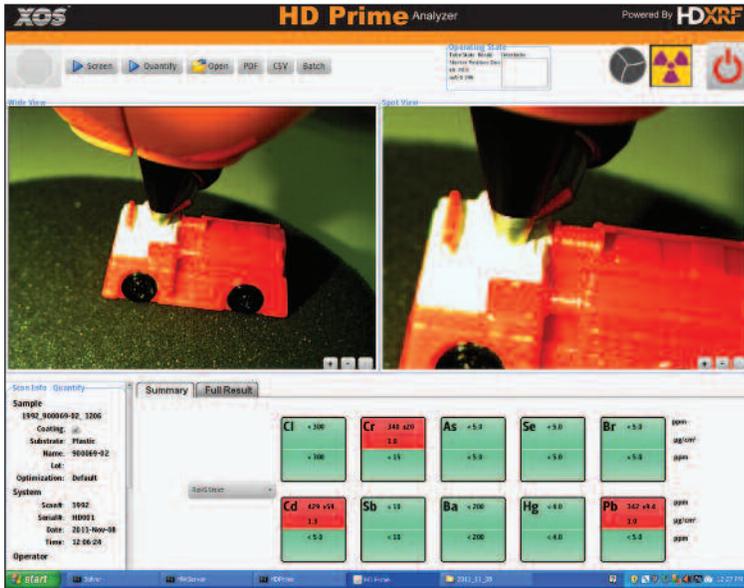
The HD Prime accommodates everything from large toys to small jewelry.

Detection Limits

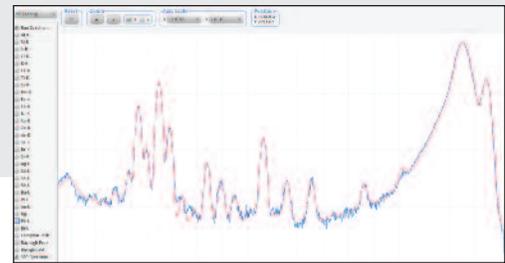
LOD in ppm	Pb	Cd	Cr	As	Br	Sb	Se	Hg	Ba	Cl
Plastic Substrate	.8	2	2	.8	1	5	1	1	50	100*
PVC Substrate	1	2	5	1	1	5	1	2	100	N/A
Coating on Plastic	5	50*	15	5	5	100*	5	8	200*	150*
Metal Substrate	10	5	15	8	N/A	20	5	10	200*	N/A
Coating on Metal	8	30*	15	8	5	60*	5	10	200*	150*

*Longer measurement time

User Interface and Data Management



- Color-coded indicators present results as Pass or Fail - separately for the product's substrate and coating.
- Elemental concentrations are indicated in ppm and in $\mu\text{g}/\text{cm}^2$.
- The fluorescence spectrum is recorded and accessible for each measurement.
- Two digital images (of whole sample and of test area) are stored with each test.
- All test results are recorded in tamper-proof format.
- Data export capability in electronic and hard copy form.
- Operation is mouse-driven and highly user-friendly.



- Large sample chamber easily accepts large and irregular shaped products.
- Plug-it-in and measure: No need for special utilities or consumables.
- Camera captures image of whole toy and analysis area.
- Measurement head is easily adjustable in all directions
- Sample chamber secured by safety interlocked doors.



Control box and computer

Measurement head

Monitor display

Keyboard and mouse

Product Specs

Elements	Pb, Sb, As, Ba, Cd, Cr, Hg, Se, Br, and Cl in addition to other elements of interest
Analysis Modes	Screening Mode: rapid determination for presence of elements Quantification Mode: accurate and precise determination of elemental concentration
	One measurement for simultaneous determination of concentration in the paint and substrate- reported separately
Measurement Time: Screening Mode Substrate and Coating	~1 minute for plastics, wood, glass, rubber, leather, textiles, bulk paint ~2 minutes for metals
Measurement time: Quantification Mode Substrate only	~2 minutes for plastics, wood, glass, rubber, leather, textiles, bulk paint ~3 minutes for metal samples
Measurement time: Quantification Mode Coatings and Substrate	~5 minutes
Analysis area	1mm diameter
Ambient Temperature	5-35° C
Relative Humidity	80% maximum
Facility AC Power requirements	90-264 VAC, 47-63 Hz
Tube voltage	20-50kV
Tube current	0.2 – 2 mA
Power Consumption	200 watts maximum

Configuration

Analyzer dimensions	H: 812 mm W: 914 mm D: 660 mm (32"x36"x26")
Sample chamber size	H: 305 mm W: 610 mm D: 457 mm (12"x24"x18")
Analyzer weight	110 kg (240 lbs)
Data output	Hard drive storage, USB output
Cameras	1 camera, 2 images: large-angle image of sample and close-up view of analysis area

User Interface

Material selection options	Plastic, Metal, Wood, Glass, Rubber, Leather, Textiles, Bulk Paint
Quantification: Test Results	Concentration in substrate in ppm (wt.). Color-coded pass/fail indicators (adjustable) Concentration in coating ppm (wt) and ug/cm ² . Color-coded pass/fail indicators (adjustable) Spectrum analysis capability included
Screening: Test Results	Pass or Fail color-coded indicators
User and sample identification and description	User inputs operator and sample detail
Digital Images	Images of sample and test areas are stored with each test result



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15 Tech Valley Drive • East Greenbush, New York 12061, USA • 518-880-1500 • Fax: 518-880-1510
email: info@xos.com • website: www.xos.com

Room 311, UnitD, Building Tianzhan, Tian'an Cyber PK, Futian District, Shenzhen 518040 China
Tel:+86 755 82502481/82502482 Fax:+86 755 82502480