JP500

A Portable and Robust Analyzer Quantify Heavy Metals in Food

Optimized for Pb, As, Hg, Cu, Zn, and Se

Pb

As

Hg

Ni

Se

Heavy Metal Testing

Powered by Monochromatic X-Ray Fluorescence (MXRF) technology, JP500 can rapidly and precisely quantify heavy-metal elements in food. Its excellent performance meets the challenge of reliably measuring extremely low-level Pb, As, and Hg, at the 0.1 ppm level for As and Pb requested by FDA regulations. Testing more samples in a shorter period with accurate, reliable analysis, JP500 is a powerful tool for risk assessments of heavy-metal contamination in food and it enables producers and customers to monitor and reduce the health risks from heavy-metal exposure.

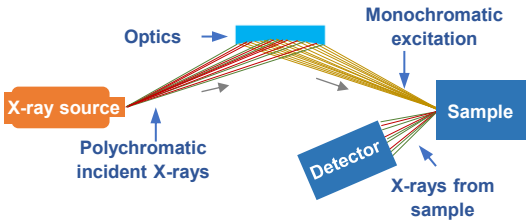
Features

1. Ultra-high signal-to-background ratio and ultra-low detection limit;
2. Portable design: light-weight, and comfortable to carry;
3. Minimum sample preparation enables on-site sampling and quantification.

MXRF Innovative Technology

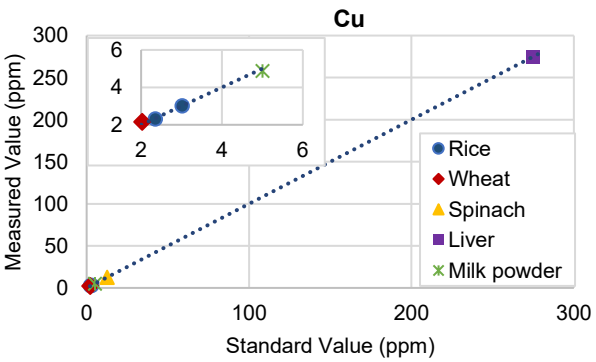
JP500 is powered by Monochromatic X-ray Fluorescence (MXRF) technology: an elemental-analysis technique offering significantly enhanced detection performance over traditional Energy-Dispersive X-ray Fluorescence (EDXRF) technology. This technique applies state-of-the-art monochromating and focusing optics, enabling dramatically higher signal-to-background ratio compared to traditional polychromatic X-ray Fluorescence. Figure 1 shows the basic configuration of MXRF and its use of focused monochromatic excitation.

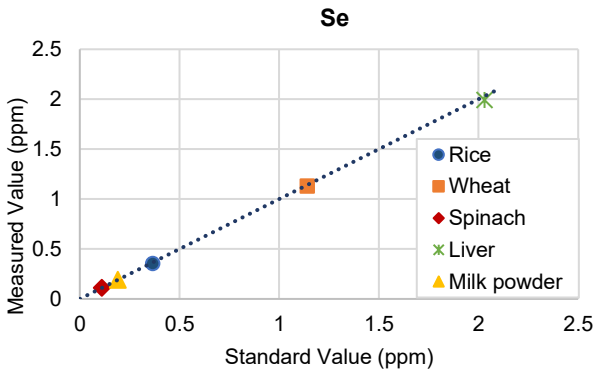
Figure 1. MXRF Technology

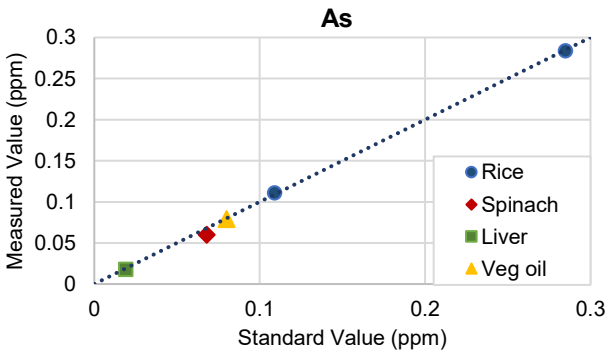


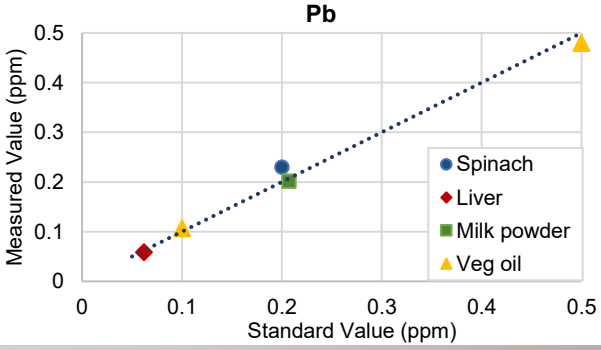
Accuracy

Excellent linearity of measurement and standard values was used to verify the accuracy of the instrument, as shown below.









Repeatability

Table 1 shows the results of repeated measurements on different standard samples to verify the stability and the accuracy.

Table 1: Repeatability Test (ppm)												
Element	**Cu**		**Ni**		**As**		**Pb**		**Se**		**Hg**	
Sample	NIST1567 Wheat	BD151 Milk powder	Veg oil	NMIJ7502 Rice	Veg oil	NMIJ7502 Rice	NIST1577 Liver	BD151 Milk powder	NIST1570 Spinach	NIST1568 Rice	NIST1570 Spinach	BD151 Milk powder
1	2.27	4.88	0.115	0.406	0.075	0.110	0.072	0.197	0.117	0.356	0.049	0.474
2	2.28	4.87	0.111	0.408	0.086	0.115	0.049	0.181	0.113	0.359	0.032	0.512
3	2.26	4.90	0.093	0.416	0.076	0.118	0.064	0.215	0.107	0.358	0.036	0.480
4	2.29	4.84	0.102	0.418	0.080	0.114	0.063	0.207	0.106	0.352	0.036	0.473
5	2.27	4.84	0.112	0.418	0.086	0.110	0.048	0.230	0.111	0.358	0.046	0.483
6	2.24	4.86	0.110	0.407	0.082	0.099	0.078	0.213	0.110	0.353	0.029	0.486
7	2.28	4.85	0.102	0.398	0.075	0.115	0.059	0.214	0.121	0.348	0.030	0.496
Average	2.27	4.86	0.106	0.410	0.080	0.111	0.062	0.208	0.112	0.355	0.037	0.486
Standard	2.03	5.00	0.100	0.390	0.100	0.109	0.062	0.207	0.110	0.365	0.030	0.520
SD	0.016	0.022	0.008	0.007	0.005	0.006	0.011	0.015	0.005	0.004	0.008	0.014
RSD (%)	0.7	0.5	7.2	1.8	5.9	5.4	17.9	7.3	4.7	1.1	21.1	2.9

Realistic Sample Analysis

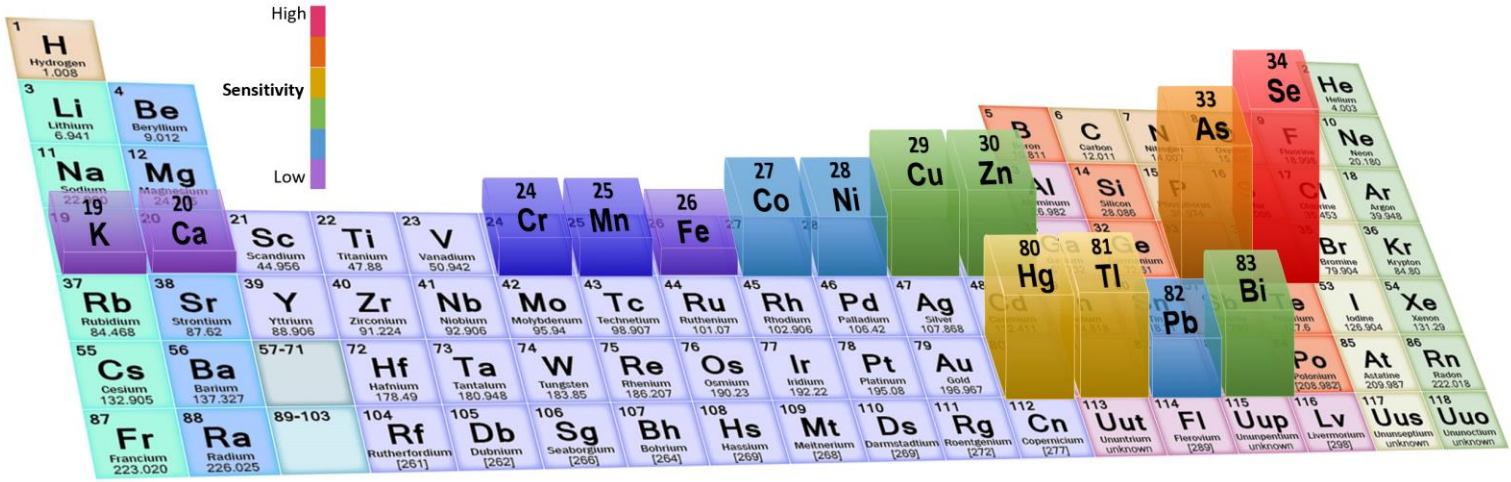
Table 2 shows the results for heavy metal analysis using JP500 for different kinds of food on the market, proving its capability of quantifying trace heavy metals in food.

Table 2：Element Test in Food Sample (ppm)							
Sample							
	Cereal	**Orzo pasta**	**Dark Chocolate**	**Wine**	**Fresh tuna**	**Fresh spinach**	**Lolli pop**
Cr	1.85	12.21	ND	0.203	0.142	2.18	0.200
Mn	25.24	10.84	7.58	1.61	0.085	2.30	ND
Fe	187.3	64.76	27.85	3.25	3.29	36.55	2.28
Ni	1.38	1.92	2.39	ND	0.211	0.532	0.108
Cu	2.51	3.53	8.09	0.134	1.39	1.25	0.181
Zn	18.90	14.36	16.69	1.41	4.29	12.91	0.134
As	0.015	0.022	0.031	0.018	0.613	0.017	ND
Se	0.127	0.559	0.050	ND	0.917	0.016	ND
Hg	ND	ND	ND	ND	0.362	ND	ND
Pb	0.042	0.070	ND	ND	0.087	0.137	ND

Table 3： JP500 – Limit of Detection (ppm) Application: Trace Heavy Metals in Food												
Element	**As**	**Hg**	**Pb**	**Cr**	**Cu**	**Ni**	**Zn**	**Mn**	**Co**	**Se**	**Tl**	**Bi**
Scan mode (100s)	0.035	0.035	0.07	0.25	0.06	0.07	0.06	0.25	0.07	0.02	0.035	0.07
Quantitative mode (600s)	0.015	0.015	0.03	0.10	0.025	0.03	0.025	0.10	0.03	0.009	0.015	0.015

Specification

The following figure shows the detection sensitivity of JP500 to different elements.



JP500 Specifications	
Measuring time	30 - 1200 s
Element range	40 elements between Al - U
Data storage and output	Printout, Ethernet, USB, internal storage, U disk
I/O port	Ethernet 10/100, USB
Power	110-240 VAC ± 10%, 50-60 Hz (Hertz)
Working temperature & humidity	+41˚F - 104˚F (5˚C - 40˚C), 30 - 85 %
Weight	9 kg
Dimensions	30 cm W x 23 cm L x 26 cm H 

Z-SPEC

Z-Spec is a fast-growing manufacturer of advanced X-ray analyzers, founded by the inventor of the MXRF technique, Dr. Zewu Chen. Its portable HDXRF systems deliver rapid, near real-time elemental analysis for applications like soil, water, food, and agriculture. With non-destructive testing and no sample preparation, Z-Spec enables faster workflows, reduced waste, and confident, on-the-spot decisions.

ZSPEC Inc

info@zspecinc.com

518.977.3876

15 Tech Valley Drive Suite 110, East Greenbush, New York 12061, United States.

Phone: 518-977-3876; Email: info@zspecinc.com