



BENCH-TOP XRF SPECTROMETER

EDX9000G PLUS

Multi-Matrix Elemental Analysis with Auto-Sampler

Used Oil · Soil · Food & Feed · Minerals · Polymers



ELEMENT RANGE Na (11) – U (92) · UPGRADEABLE TO F (9) – AM (95)

NO SAMPLE PREPARATION

AIR / VACUUM / HELIUM ATMOSPHERE

UHP FAST SDD DETECTOR

FP STANDARDLESS ALGORITHM

Efficiency **Meets** Accuracy

www.esi-xrf.com

One Instrument. Every Matrix.

The EDX9000G PLUS bench-top XRF spectrometer combines an ultra-high-performance Fast SDD detector, a 4096-channel digital pulse processor and a detachable 10-position auto-sampler. Measuring in air, vacuum or helium atmosphere, it covers the full element range from sodium to uranium — one platform for oils, soils, food, minerals and polymers, with no recalibration between samples.



EDX9000G PLUS — DIRECT-LOADING SAMPLE DECK

UHP Fast SDD Detector

Ultra-low-noise silicon drift detector with linear power supply; optional ultra-thin window enhances light-element (low-Z) sensitivity.

4096-Channel Digital DPP

Dual third-order electronic filtering keeps peak drift below 0.5 channels over 24 hours — stable results shift after shift.

Detachable Auto-Sampler

10-position carousel (12 / 14 / 20 optional) with optional sample-cup spinner for unattended batch analysis.

Air · Vacuum · Helium

Three measurement atmospheres in one chamber — light elements under vacuum or helium, heavier elements in air.

Application	Sample & Preparation	Atmosphere
Elements in Used Oil	Used oil pipetted directly into the dedicated oil sample cup — no dilution, no pre-treatment	Helium: Na, Mg, Al, Si, P · Air: remaining elements
Elements in Soil (CRM)	Soil loaded directly into the powder-specific vacuum sample cup — no pellet pressing, no fusion	Vacuum: Na, Mg, Al, Si · Air: remaining elements
Elements in Milk Powder	Milk powder prepared by the pressed-pellet method	Vacuum: Na, Mg, P, S · Air: remaining elements

Instrument Calibration & QC

Measurement, calibration and quality-control procedures comply with IP 558 and ASTM D7343. Calibration status was verified with the Ag reference standard before each test series.

Purpose-built sample handling. The oil-dedicated sample cups and auto-sampler enable fast batch determination of sulfur, chlorine and metallic / non-metallic elements in diverse oil samples; powder-specific vacuum cups allow ores, grains and chemical raw materials to be tested directly under vacuum — no pellet pressing or fusion, dramatically improving testing efficiency.

One Platform. Every Industry.

The excellent analytical performance of the EDX9000G PLUS allows it to easily solve the most challenging analytical tasks across a wide range of applications — from refinery laboratories to museum conservation, on a single bench-top platform.

Oils, Fuels, Lubricants & Wear Metals

Sulfur, chlorine and metals in crude oil, fuels and lubricants.

ASTM D4294 · D5059 · D5839 · D6481 · D7684 · D7751 · D8127 · D8252 ·
ISO 8754 · ISO 13032 · ISO 20847 · IP 336 · IP 496 · JIS K2541 · DIN
51399 · GB/T 17040 · SH/T 0742 · GB/T 39299

Water, Liquids & Pollution Waste

Trace metals and hazardous elements in process water, effluents and liquid waste streams.

Food & Consumer Safety

Nutritional minerals and heavy-metal screening in food and feed.

ISO 17054:2010 · AOAC 985.01 · FDA 21 CFR Part 109 · (EC) No 1881/2006
· GB 2762-2022 · GB 5009.268-2016 · GB 14880-2012

Cosmetics

Heavy metals and restricted elements in cosmetic raw materials and finished products.

ISO 21392:2019 · (EC) No 1223/2009 · FDA 21 CFR Part 700 · GB 7916-2022 · QB/T 4079-2010

Construction Materials, Refractories & Ceramics

Quality control of cement, clinker, glass, refractory and ceramic raw materials.

Metallurgical Slags & Mining Ores

Grade control, process monitoring and slag valorization analysis.

Geology, Minerals & Soils

Elemental screening of soils, sediments and geological samples.

ISO 13196 · EPA Method 6200 · HJ 1425 · NY/T 4435

Plastics & Polymers

Heavy-metal compliance for toys per CPSIA / GB 6675; inorganic fillers (CaCO₃, talc, TiO₂, BaSO₄); Ca-Zn / Ba-Zn / organotin stabilizers in PVC; PE / PP catalyst residues per ASTM D6247 · ASTM F2617.

Alloys, Precious Metals & Catalysts

Ferrous and non-ferrous alloys, precious-metal assay and catalyst screening.

Gemstones & Museum Artifacts

Non-destructive analysis of gemstones, jewelry and cultural heritage objects.

Airborne Particulate Matter

Elemental analysis of filter-collected air particulate samples.

EPA Method IO-3.3

Forensics, Science & Research

Forensic trace-evidence screening and a flexible platform for academic method development.

One calibration philosophy, many matrices. Air, vacuum and helium measurement atmospheres, the standardless FP algorithm and application-specific calibrations let the same instrument move from sulfur in fuel to heavy metals in soil without hardware changes.

Elements in Used Oil — Repeatability

Ten Consecutive Runs — No Recalibration Between Runs

Unit: ppm (mg/kg)

Sample: used engine oil · **Preparation:** pipetted directly into the dedicated oil sample cup, no pre-treatment · **Atmosphere:** Na, Mg, Al, Si, P measured under helium; remaining elements in air.

RUN	Na	Mg	Al	Si	P	S	Ca	Fe	Cu	Zn	Mo	Pb	Cd	Ba	Ag	Sn
1	302.2	151.8	151.7	102.0	50.1	20.1	186.2	25.1	36.2	40.1	100.1	10.1	20.1	80.1	40.1	65.1
2	298.8	148.7	148.8	99.0	50.0	20.0	186.2	25.0	36.2	40.0	100.0	10.0	20.0	80.0	39.9	64.9
3	301.6	151.2	151.2	101.4	50.1	20.0	186.3	25.1	36.3	40.1	100.1	10.0	20.0	80.1	40.0	65.1
4	299.2	149.2	149.2	99.4	50.0	20.0	186.2	24.9	36.2	39.9	100.0	10.0	20.0	80.0	40.0	64.9
5	299.9	149.8	149.7	99.8	50.0	20.0	186.3	25.0	36.3	40.0	100.0	10.0	20.0	80.0	40.0	65.0
6	301.9	148.9	148.8	101.6	50.0	20.0	186.2	25.0	36.2	40.0	100.0	10.0	20.0	80.0	40.0	64.9
7	302.1	151.8	151.7	101.8	50.0	20.1	186.3	25.1	36.3	40.1	100.1	10.0	20.1	80.1	40.1	65.1
8	299.0	148.7	148.8	99.0	50.0	20.0	186.2	24.9	36.2	39.9	100.0	10.0	20.0	80.0	39.9	64.9
9	301.8	151.4	151.3	101.5	50.1	20.1	186.3	25.1	36.3	40.1	100.1	10.1	20.1	80.1	40.1	65.1
10	300.1	150.2	150.3	100.2	50.0	20.0	186.3	25.0	36.2	40.0	100.0	10.0	20.0	80.0	40.0	65.0
Mean	300.7	150.2	150.2	100.6	50.0	20.0	186.3	25.0	36.2	40.0	100.0	10.0	20.0	80.0	40.0	65.0
SD	1.4	1.3	1.2	1.2	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1
RSD (%)	0.4650	0.8590	0.8150	1.1892	0.0935	0.1413	0.0269	0.2372	0.0712	0.2006	0.0566	0.2577	0.1737	0.0684	0.1515	0.1431

Wear metals, additives and contaminants in one run. Additive elements (Ca, Zn, P, Ba, Mo), wear metals (Fe, Cu, Pb, Sn, Ag) and contaminants (Si, Cd) are quantified simultaneously with sub-1 % RSD for the major components — the basis for reliable ASTM D7751 / D6481 / D5059-compliant lubricant analysis.

Key Results at a Glance

Sulfur at 20.0 ppm repeats with RSD 0.14 %; calcium additive at 186.3 ppm with RSD 0.03 %; lead wear metal at 10.0 ppm with RSD 0.26 %. All sixteen elements hold RSD below 1.2 % across ten consecutive runs.

Method Compliance

Covers the element suite of ASTM D7751 (additive elements in lubricating oils), ASTM D6481 and ASTM D5059, with calibration and QC per IP 558 / ASTM D7343 — ready for used-oil and condition-monitoring laboratories.

From fleet labs to engine rooms. With the 10-position auto-sampler, a full batch of oil cups is measured unattended — wear-metal trending for fleet maintenance, power generation and marine engine monitoring without dilution or sample pre-treatment.



USED-OIL & LUBRICANT ANALYSIS — FLEET MAINTENANCE · POWER GENERATION · MARINE ENGINE ROOMS

Elements in Soil — Repeatability

Sample: soil certified reference material · **Preparation:** loaded directly into the powder-specific vacuum sample cup, no pellet pressing or fusion · **Atmosphere:** Na, Mg, Al, Si measured under vacuum; remaining elements in air.

Table 2-A — Major Oxides								Unit: % (mass fraction)
RUN	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	K ₂ O	MgO	Na ₂ O	TiO ₂
1	62.3700	13.8000	5.2500	2.0500	2.3500	1.6300	1.3700	0.7200
2	62.4000	13.7900	5.2500	2.0500	2.3500	1.6200	1.3700	0.7200
3	62.3600	13.8300	5.2500	2.0400	2.3400	1.6200	1.3800	0.7200
4	62.3600	13.8100	5.2400	2.0600	2.3500	1.6200	1.3700	0.7200
5	62.3500	13.8100	5.2500	2.0600	2.3500	1.6200	1.3800	0.7200
6	62.4000	13.8300	5.2500	2.0500	2.3500	1.6200	1.3900	0.7200
7	62.3400	13.8100	5.2500	2.0500	2.3500	1.6200	1.3700	0.7200
8	62.4400	13.7600	5.2600	2.0500	2.3500	1.6300	1.3800	0.7200
9	62.4100	13.7800	5.2500	2.0500	2.3500	1.6300	1.3800	0.7200
10	62.4300	13.7700	5.2400	2.0600	2.3600	1.6200	1.3700	0.7200
Mean	62.3860	13.7990	5.2490	2.0520	2.3500	1.6230	1.3760	0.7200
SD	0.0347	0.0238	0.0057	0.0063	0.0047	0.0048	0.0070	0.0000
RSD (%)	0.0556	0.1723	0.1081	0.3082	0.2006	0.2976	0.5081	0.0000

Table 2-B — Trace Heavy Metals								Unit: mg/kg (ppm)
RUN	Cr	Ni	Cu	Zn	As	Rb	Sr	Pb
1	84.1	39.6	31.0	95.1	17.4	112.1	186.4	34.1
2	83.2	38.8	30.6	95.3	17.5	111.2	185.1	33.6
3	83.3	39.1	31.3	94.1	18.0	112.2	185.5	34.1
4	83.7	38.7	31.2	95.1	17.1	111.6	183.0	33.8
5	84.3	38.9	31.6	94.8	17.9	111.6	184.9	34.4
6	83.4	38.9	30.4	94.8	17.6	110.2	184.1	32.8
7	84.1	38.8	31.3	94.8	17.2	112.4	183.6	34.1
8	84.1	38.6	30.9	94.4	17.3	111.8	184.9	33.7
9	84.1	39.4	30.8	94.5	17.5	111.6	186.3	34.3
10	83.7	39.2	30.9	94.2	17.4	111.0	185.4	34.7
Mean	83.8	39.0	31.0	94.7	17.5	111.6	184.9	34.0
SD	0.4	0.3	0.4	0.4	0.3	0.6	1.1	0.5
RSD (%)	0.4707	0.8198	1.1581	0.4237	1.6272	0.5794	0.5923	1.5470

Screening-grade speed, laboratory-grade stability. SiO₂ at 62.4 % repeats with RSD 0.06 %, while trace metals such as Pb (~34 mg/kg) and As (~17.5 mg/kg) hold RSD below 1.6 % — performance consistent with EPA Method 6200 and ISO 13196 field-to-lab soil screening workflows.

Key Results at a Glance

SiO₂ 62.3860 % · RSD 0.0556 % | Al₂O₃ 13.7990 % · RSD 0.1723 %
| Pb 34.0 mg/kg · RSD 1.5470 % | As 17.5 mg/kg · RSD 1.6272 %.

Direct Loading, No Pellet Pressing

The powder-specific vacuum cup accepts loose soil directly — no pressing, no fusion — matching the sampling philosophy of EPA Method 6200 and ISO 13196 for rapid on-site and laboratory screening.

Elements in Milk Powder — Repeatability

Ten Consecutive Runs — Pressed Pellet

Unit: ppm (mg/kg)

Sample: milk powder · Preparation: pressed-pellet method · Atmosphere: Na, Mg, P, S measured under vacuum; remaining elements in air.

RUN	Na	Mg	P	S	K	Ca	Fe	Cu	Zn	Pb	As	Cd
1	2512.4	512.2	3025.7	312.6	4536.2	3526.4	52.4	5.3	42.4	2.8	3.2	1.2
2	2498.2	508.6	3008.7	309.8	4512.4	3508.7	51.9	5.2	41.9	2.6	3.0	1.1
3	2506.9	510.4	3016.5	311.2	4524.8	3518.4	52.1	5.2	42.1	2.7	3.0	1.1
4	2495.4	507.9	3002.4	308.6	4508.6	3504.3	51.9	5.2	41.9	2.6	2.9	1.0
5	2503.8	509.7	3012.5	310.5	4520.1	3515.6	52.1	5.2	42.1	2.7	3.0	1.1
6	2515.6	513.1	3029.0	313.3	4540.3	3530.2	52.5	5.3	42.5	2.9	3.2	1.2
7	2492.6	506.9	2998.7	307.9	4505.5	3501.6	51.8	5.1	41.8	2.6	2.9	1.0
8	2507.2	510.7	3018.7	311.7	4526.8	3520.4	52.2	5.2	42.2	2.7	3.0	1.1
9	2511.0	511.9	3022.2	312.1	4532.6	3523.8	52.3	5.2	42.3	2.8	3.1	1.1
10	2501.4	509.3	3009.8	309.5	4518.7	3512.6	52.0	5.2	42.0	2.6	3.0	1.1
Mean	2504.4	510.1	3014.4	310.7	4522.6	3516.2	52.1	5.2	42.1	2.7	3.0	1.1
SD	7.6	2.0	9.8	1.8	11.7	9.4	0.2	0.0	0.2	0.1	0.1	0.1
RSD (%)	0.3022	0.3878	0.3266	0.5685	0.2592	0.2686	0.4163	0.8911	0.5151	3.3478	3.4287	6.1416

Nutrients and contaminants together. Nutrient elements (Na, Mg, P, S, K, Ca, Fe, Cu, Zn) and heavy-metal contaminants (Pb, As, Cd) are measured in a single run. K at ~4,520 ppm repeats with RSD below 0.3 %, and Cd near 1.1 ppm remains clearly quantified — supporting food-safety screening per GB 2762 / GB 5009.268 and ISO 17054 workflows.

Key Results at a Glance

K 4522.6 ppm · RSD 0.2592 % | Ca 3516.2 ppm · RSD 0.2686 % | Pb 2.7 ppm · RSD 3.3478 % | Cd 1.1 ppm — still quantified at single-ppm level.

Food-Safety Compliance

Nutritional labeling and contaminant control in one measurement — aligned with GB 2762 limits, GB 5009.268 multi-element determination and ISO 17054 routine analysis of food and feed products.

Beyond dairy. The same pressed-pellet workflow extends directly to flour, cereals, feed, starch and food additives — light elements under vacuum, heavier elements in air, all in a single unattended run.



DEDICATED SAMPLE BOX — CUPS · PIPETTES · TOOLS



XRF THIN-FILM ROLL FOR SAMPLE CUPS

Key Specifications

Item	Specification
Elemental range	Na (11) – U (92); system upgradeable to F (9) – Am (95)
Concentration range	< 1 ppm up to 100 %
Detector	UHP Fast silicon drift detector (FSDD) with linear power supply system, ultra-low noise; optional ultra-thin detector window for enhanced light-element (low-Z) performance
Pulse processor	4096-channel digital multichannel analyzer (DPP) with dual third-order electronic filtering; peak drift < 0.5 channels (24 h)
Excitation source	Thin-beryllium-window high-flux X-ray tube; 0 – 50 kV in 1 kV steps; tube current 0 – 2000 µA
Optics	Multi-collimator and six-position filter changer with patented background-correction technology
Sample chamber	365 × 360 × 60 mm — extra-large vacuum chamber accepting oversized alloy parts and irregular samples; air / vacuum / helium atmosphere
Auto-sampler	Detachable 10-position carousel (12 / 14 / 20 positions optional); optional sample-cup spinner for the 10-position tray
Sample viewing	High-resolution CCD camera
Dimensions / Weight	704 × 555 × 414 mm / 65 kg
Power / Environment	220 V AC, 50/60 Hz · –10 °C to 35 °C
Calibration & QC compliance	IP 558 · ASTM D7343
Compliance	CE: EN 55032, EN 55035, EN 61000, EN 61010 · Radiation safety: GBZ 115-2023
Standard accessories	Mylar test film (1 roll) · sample cups (50 sets) · sampling pipettes (1 bag, 50 pcs) · power cable · Ag calibration standard · USB hub · CE certificate, warranty card

Software built for routine work. The XRF application software offers fast calibration setup, password protection that prevents accidental changes to calibration parameters or valuable data, and a standardless FP algorithm that quantifies unknown samples without user-supplied standards.



Quality & Safety Certified

ISO 9001:2015 quality management · CE compliant · Radiation safety per GBZ 115-2023

Efficiency Scientific Instrument Co., Ltd.

Block 2, OETPARK, No. 69 Weixin Road, Suzhou Industrial Park, Suzhou, Jiangsu, China
Tel: +86-512-68635865 · E-mail: sales@esi-xrf.com · www.esi-xrf.com

Efficiency Scientific Instrument Co., Ltd. reserves the right to modify specifications without prior notice.
All technical data presented herein are based on standard operating conditions and certified reference materials.
© Efficiency Scientific Instrument Co., Ltd. All rights reserved.