



Screen Heavy & Toxic Metals

As ³³	Hg ⁸⁰	Pb ⁸²	U ⁹²
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Determine Nutrients & Fortificants

Mn ²⁵	Fe ²⁶	Cu ²⁹	Zn ³⁰	Mo ⁴²
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Analyze Fertilizers & Treatments

P ¹⁵	S ¹⁶	K ¹⁹	Ca ²⁰
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Portable Elemental Analysis

- Food safety and agriculture solutions





Healthy soil, crops and food maximize farm-to-table safety, quality & profitability



Safe and nutritious food is of primary concern to everyone, from the farm to the table. The recent prevalence of contaminants and adulterated, counterfeit or fraudulent food has led to an increase in public awareness and government regulations.

Simple, routine and sophisticated science-based methods enable a reliable, precise, accurate, transparent and harmonious decision making process for safe and nutritious food the world over.

Bruker's portable XRF solutions offer multi-element analysis with off-the-shelf or customized methods to provide actionable results at any stage of the food production process – from the presence of required elemental nutrients to threats from elemental and metal contaminants.

Bruker provides science-based portable XRF solutions for rapid, routine testing and in-depth research analysis for food and agriculture applications in the lab, factory or in the field

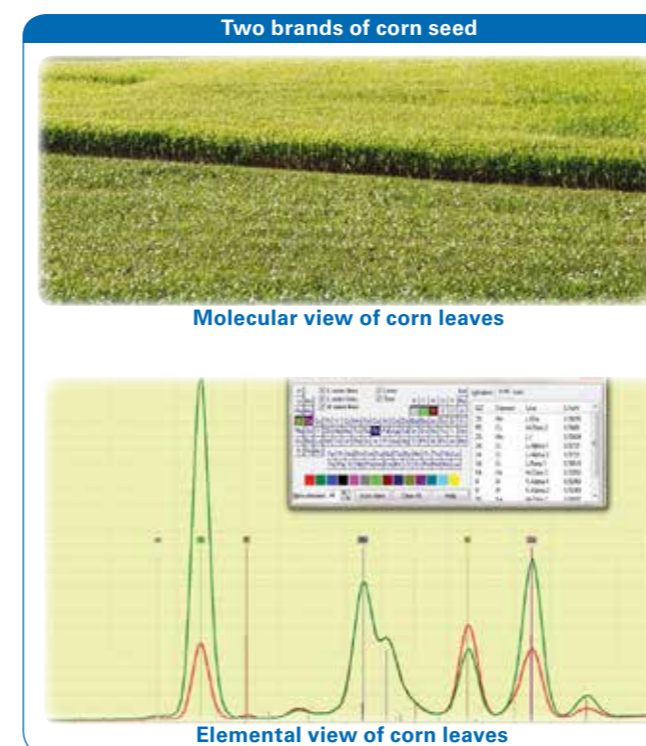
Portable elemental analysis solutions for farm-to-table safety, quality & profitability

Sustainable and healthy soil, crops & food

- Elemental content, characterization & profiling

Food control management & inspection

- Quality analysis at critical control points for raw materials, during process and finished products
- Hazardous analysis at critical control points for intentional & incidental adulterants and metallic contaminants



Characterize fields quickly and non-destructively for optimized planting

- Analyze elemental composition of soil to confirm healthy and sustainable fields
- Determine elemental properties of area soil, irrigation source and fertilizer for optimized crop quality and yield
- Compare quality and yield of various seed brands or fertilizer mixes
- Analyze elemental nutrient content in plants and leaves



Generate elemental maps in 2D or 3D with portable XRF data



2D relative abundance plot of sulfur on a tomato



Examine fertilizer and treatment effectiveness

- Research elemental properties of soil and fertilizer placement to determine maximum yield mixes in support of regional farming
- Optimize surface treatments such as Ca, Cl, S on produce for preservation of product from farm to market to minimize financial loss
- Analyze elemental nutrient content of solid, powdered or liquid organic and manufactured fertilizers before field distribution

Pass/Fail results for incoming, in-process or end products

48 Test	PASS	Time	73.0
EI	PASS	PPM	FAIL +/-
Pb	700	27	1300 16
Cl	700	0	1300 31
Ba	700	0	1300 43
Sb	700	0	1300 33
Cd	70	0	130 16
Se	700	0	1300 4
Hg	700	0	1300 3

85 Test	FAIL	Time	58.0
EI	PASS	PPM	FAIL +/-
Cl	700	460K	1300 3533
Pb	700	8658	1300 104
Hg	700	26	1300 23
Se	700	19	1300 9
Ba	700	0	1300 147
Sb	700	0	1300 104
Cd	70	0	130 45

QC/QA incoming material as well as in-process and finished products

- Determine elemental nutrient content in products such as Se or Mo in dietary supplements or Fe in animal feed
- Analyze elemental food content for fortificants such as Fe and Ca in milk liquid and powder or I in salt
- Screen raw materials and finished products for metals such as Pb, Hg or As
- Identify intentional or incidental adulterants such as Pb or Cr colorants or As and Br from pesticides

Screen for toxic metals in water, soil & plants

- Monitor heavy metals (Pb, As, Hg and more) in-situ and in real time
- Determine toxic metal concentrations in water, soil, sediments and crops with matrix-matched standards
- Profile phytoremediation effectiveness by characterizing toxic metal uptake in soil remediation plants such as Indian Mustard (for Cd, Pb, Se, Zn, Hg, Cu, 137Cs), White Willow (for Cd, Ni, Pb), Sunflower (for Pb, Zn), Hemp (Cd, Pb, Ni 137Cs) or Ladder Brake (for As)

Screen all Food Contact Materials (FCMs)

Positive Material Identification (PMI) of incoming stock, in-process materials and finished products

- Check for hazardous elements in food packaging such as plastics, polymer films, tins, cans, and cardboard packs
- Confirm metal and alloy grades of incoming and in-service piping, tubing, components, parts and welds
- Monitor blending, grinding and mixing operations for metal contamination
- Check heavy planting, harvesting and transportation equipment & machinery components to ensure safe and durable alloy grades





Portable elemental analysis for food & its production

Micronutrients				
Mn ²⁵	Fe ²⁶	Cu ²⁹	Zn ³⁰	Mo ⁴²
Critical Nutrients				
P ¹⁵	S ¹⁶	K ¹⁹	Ca ²⁰	
Toxic Metals				
As ³³	Hg ⁸⁰	Pb ⁸²	U ⁹²	

Elemental analysis provides key information to help assure the presence of essential and beneficial nutrients and the absence of toxic metals in food, plants, soil and water.

When you can't bring samples to the analyzer, you can take Bruker's Handheld XRF Analyzers (HHXRF) to them. These multi-element analyzers are ideal for in-situ research, screening heavy metals and elemental nutrients, or fast ID of alloys & metals in parts & processing equipment. They can even be pre-calibrated for customized applications.

Bruker portable XRF analyzer benefits

- Non-destructive measurement of sample material as-is or with minimal sample preparation
- Battery operated and ruggedized analyzers, ideal for remote locations, at-line and in-situ tests
- Off-the-shelf pre-installed calibrations for point-and-shoot testing with no user adjustments necessary
- Advanced data analysis software for qualitative and custom or user generated quantitative analysis
- Low operation and maintenance costs with no hazardous waste disposal requirements
- Powerful, green alternative to traditional ICP and AAS atomic spectroscopy methods

Field portable elemental analysis



Our portable Tracer Analyzer with air, helium or vacuum beam paths and customizable filters provides lab-like qualitative and quantitative analysis of elements from sodium to uranium. The advanced Tracer XRF enables detection limits of the lightest elements at detection limits lower than standard HHXRFs. Its versatility enables research and methods development for multi-element analyses with custom SRMs for soil, fertilizers, seeds, plants, crops & treatments, liquids and more.

Point-and-shoot handheld XRF



Our S1 TITAN point-and-shoot HHXRF provides fast results in composition, pass/fail or Y/N for Mg to U in soil, dry plant matter, incoming biomaterial and final food products for well-defined and standard materials and methods. Options for off-the-shelf or custom calibrations are available. The S1 TITAN is a workhorse for fast metal and alloy ID of incoming and in-service piping, tubing, components, parts and welds.



Health & safety, quality & yield, profitability & sustainability

Bruker portable XRF analyzers can help reach your objectives

Farming

Soil
Seeds
Irrigation
Fertilizers
Treatments
Plants & feed

Processing

Raw materials
Mixes/blends
Stored goods
Equipment
Waste

End products

Beverages
Snacks & condiments
Grains
Supplements
Packaging

Materials

Liquids, slurries & powders
Soil, sediment & sludge
Cellulose, polymers & paper
Solids, metals & alloys

Measurements

Nutrient content
Nutrient profiling
Elemental composition
Elemental mapping
Fortificant content
Adulterant content
Heavy metal content
Metallic contaminants
Alloy grade ID

Time to measure

Minimal to no sample prep
Screen content in seconds
Measure content in minutes
Analyze for actionable results

Nutrients & fortificants

Manganese (Mn)
Iron (Fe)
Copper (Cu)
Zinc (Zn)
Selenium (Se)
Molybdenum (Mo) & more

Fertilizers & treatments

Sodium (Na)
Phosphorus (P)
Sulfur (S)
Potassium (K)
Calcium (Ca) & more

Heavy & toxic metals

Arsenic (As)
Mercury (Hg)
Thallium (Tl)
Lead (Pb)
Uranium (U) & more



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