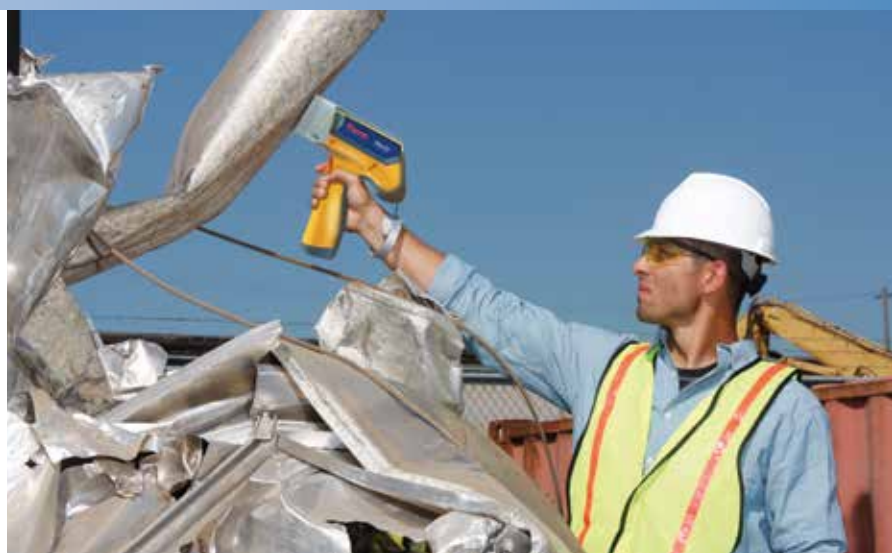
Thermo Scientific Niton XL2 100G XRF Analyzer

General Metal Analyzer

Thermo Scientific Niton XL2 analyzers provide you with many distinct advantages:

- Precise elemental analysis of alloy materials
- From turn on to trigger pull to near instantaneous results
- Very easy to use – even by non-technical personnel
- Rugged design for the most challenging industrial environments
- Completely nondestructive test



Built for the Way You Work

The value choice Thermo Scientific™ Niton™ XL2 analyzer offers high performance and advanced electronics while maintaining the point-and-shoot simplicity that is the hallmark of all our x-ray fluorescence (XRF) instruments. Sealed against moisture and dust with 100% embedded software tools, these analyzers are lightweight yet ruggedly built to withstand the harshest environments – in the field or on the shop floor.

Ergonomically designed and featuring daylight-readable icons, the Niton XL2 100G incorporates customizable menus, multiple language options, and a standard analytical range of 25 elements from titanium to bismuth.

The Instrument of Choice

The Niton XL2 is the instrument of choice to ensure accuracy, precision, and ease of use. It is the ideal instrument to:

- Analyze metal alloys for scrap recycling or final product QC
- Rapid alloy ID for incoming QC

The Niton XL2 is the definitive tool for scrap metal recycling. It provides immediate nondestructive chemical analysis of common alloy materials. With its unparalleled accuracy, you can be sure that the Niton XL2 100G precisely identifies grade and value of scrap.

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Niton XL2 100G: With point-and-shoot simplicity, you can view the alloy grade and chemistry on the built-in, color, touch-screen display.

The Niton XL2 100G stands far above the competition, with its many standard features and available options. By utilizing the standard Thermo Scientific Niton Data Transfer (NDT©) PC software suite to customize the instrument, you can set operator permissions, generate custom reports, print certificates of analysis personalized with your own company logo, or remotely monitor and operate the instrument hands-free from your PC. Integrated USB and Bluetooth® communications provide direct data transfer to your PC or networked storage device, eliminating the cumbersome data synchronization procedures required by Windows Mobile®-based XRF analyzers.

Thermo Scientific Niton XL2 100G Specifications	
Weight	3 lbs 5.8 oz (1.53 kg)
Dimensions	10.25 x 11 x 4 in. (256 x 275 x 100 mm)
Tube	Ag anode 38kV maximum, 80 uA maximum
Detector	High-performance semiconductor
System Electronics	400 MHz ARM 11 CPU 300 MHz dedicated DSP 80 MHz ASICS DSP for signal processing 4096 channel MCA 64 MB internal system memory/128 MB internal user storage
Display	Fixed angle, color, touch-screen display
Standard Analytical Range	25 elements from Ti to Bi
Data Storage	Internal >10,000 readings with spectra
Data Transfer	USB, Bluetooth™, and RS-232 serial communication
Security	Password-protected user security
Mode	Alloy Modes: Metal Alloy
Data Entry	Touch-screen keyboard User-programmable pick lists Optional wireless remote barcode reader
Standard Accessories	Locking shielded carrying case Shielded belt holster One 6-cell Li-ion battery pack 110/220 VAC battery charger/ AC adaptor PC connection cables (USB and RS-232) Niton Data Transfer (NDT) PC software Safety lanyard Check samples/standards
Optional Features and Accessories	Thermo Scientific portable test stand, stationary (bench-top) stand, mobile test stand
Licensing/Registration	Varies by region. Contact your local distributor.
Compliance	CE, RoHS

Thermo Scientific Niton XL2 analyzers represent just one of our handheld analyzer solutions, which include XRF tools for metal alloy identification, lead-based paint testing, RCRA metals in soil, toy and consumer goods screening, RoHS and WEEE compliance screening, and many other analysis needs.

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10/2015

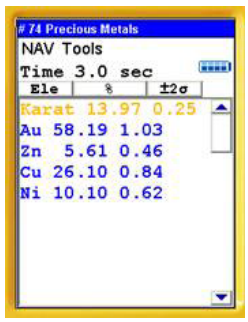
Product Specifications

Thermo Scientific Niton XL2 XRF Precious Metal Analyzer

Thermo Scientific Niton XL2 x-ray fluorescence (XRF) precious metal analyzers deliver fast and accurate analysis results in an easy-to-use, robust, and reliable package. Harness the power of XRF technology and take control of your operations. Whether you are in the business of buying and recycling scrap jewelry, manufacturing precious metal items, or refining, you can be confident that your operations are backed by the pioneer in portable XRF technology.

Thermo Scientific Niton XL2 precious metal analyzers provide you with many distinct advantages:

- **Easier, faster, more accurate than nitric acid test methods**
- **Faster, more comprehensive analysis than fire assay, with comparable accuracy**
- **Simultaneous analysis of all precious metals as well as many other common alloying elements**



Example of 14k gold analysis.

Laboratory-quality Analysis in the Palm of Your Hand

Throughout the precious metal life cycle – from refining to recycling – the goal is always to ensure quality, control costs, and achieve accurate purity analysis. With the volatility and high price of precious metals, even a small variation in composition accuracy can be expensive. Thermo Scientific Niton x-ray fluorescence (XRF) analyzers deliver fast, reliable results – and unlike more traditional testing methods, are completely nondestructive. These analyzers provide you with the ideal method to test the purity and chemistry of all precious metals, with unmatched simplicity, performance, features, and portability. You also get an accurate chemical analysis of tramp and trace elements, which could impact valuation and future refining needs.

Take your Thermo Scientific Niton analyzer anywhere. It's your personal field laboratory for dependable elemental analysis that delivers a real competitive edge.

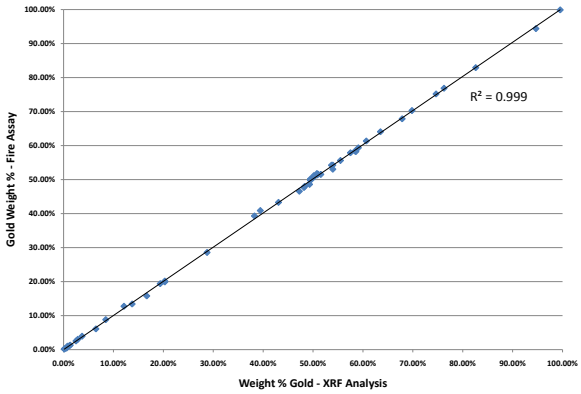
The Instrument of Choice

Just a few seconds – that's all it takes to measure the exact precious metal content in jewelry, coins, and other valuable products using the Niton® XL2 precious metal analyzer. You get all the power of our top-of-the-line instruments in a value-packaged solution.

- Exceptionally fast, easy to use – Just point and shoot or close the lid (with test stand). See results in seconds on a touch-screen color display. No need to use any harsh chemicals or acids that can burn your fingers, ruin clothing, and damage countertops.
- Fit, form, function – Engineered from the ground up, keeping ergonomics and ease-of-use in mind, Thermo Scientific Niton XL2 precious metal analyzers ship from the factory fully calibrated and ready to use upon arrival at your site. Minimal training is required and our built-in system check helps ensure your instrument continues to run as well as it did the day it arrived.
- Nondestructive – Unlike destructive testing methods, such as acid and fire assay, samples remain intact and undamaged.
- Lab-quality performance – Thermo Scientific Niton XRF analyzers make use of the most advanced electronics and detectors available today. All of our instruments use either silicon PIN (Si-PIN) or silicon drift detectors (SDD), which are also found in large and expensive laboratory equipment.

Niton XL2 XRF Analyzers – Learn More

For more information on the Niton XL2 Series or any of the other portable XRF instruments in our product family, please contact your local Thermo Scientific Niton Analyzer representative or visit www.thermoscientific.com/niton.



Gold content analysis – Thermo Scientific Niton XRF analyzer vs. fire assay

Thermo Scientific Niton XL2 analyzers represent just one of our portable analyzer solutions, which include XRF tools for metal alloy identification, lead paint inspection, RCRA metals in soil, toy and consumer goods testing, RoHS and WEEE compliance screening, and many other analysis needs.

Thermo Scientific Niton XL2 Precious Metal Analyzer Specifications

Weight	**< 3 lbs 10.7 oz (1.66 kg)**
Dimensions	**10.25 x 11 x 4 in. (256 x 275 x 100 mm)**
Tube	**Ag anode 45 kV maximum, 80 µA maximum**
Detector	**High-performance semiconductor**
System Electronics	**400 MHz ARM 11 CPU** **300 MHz dedicated DSP** **80 MHz ASICS DSP for signal processing** **4096 channel MCA** **64 MB internal system memory/ 128MB internal user storage**
Display	**Fixed angle, color, touch-screen display**
Standard Analytical Range	**22 elements including all precious metals**
Data Storage	**Internal >10,000 readings with spectra**
Data Transfer	**USB, Bluetooth™, and RS-232 serial communication**
Security	**Password-protected user security**
Mode	**Precious Metals**
Data Entry	**Touch-screen keyboard** **User-programmable pick lists** **Optional wireless remote barcode reader**
Standard Accessories and Features	**Locking shielded carrying case** **Shielded belt holster** **One 6-cell lithium-ion battery pack** **110/220 VAC battery charger/ AC adaptor** **PC connection cables (USB and RS-232)** **Niton Data Transfer (NDT™) PC software** **Safety lanyard** **Mobile test stand**
Optional Features and Accessories	**Thermo Scientific portable test stand** **Additional battery pack** **Wireless portable printer** **Barcode scanner**
Licensing/Registration	**Varies by region. Contact your local distributor.**
Compliance	**CE, RoHS**

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Thermo Scientific Niton XL2 700 Series Analyzers

Consumer Goods Screening – Elemental Limits of Detection in Metals and Polymers

In addition to the offices listed below, Thermo Scientific Niton Anaylzers maintains a network of sales and service organizations throughout the world.

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The Niton® XL2 700 Series x-ray fluorescence (XRF) analyzer is the solid value choice for your toughest testing applications. These purpose-built instruments for consumer goods analysis utilize a proprietary Fundamental Parameters (FP)-based routine and TestAll™ technology for quick and accurate results on plastics, polymers, and metal alloy samples, including solders, with no user input.

The limits of detection (LODs) is the minimum concentration of an element that can be detected with a reasonable degree of statistical confidence. Detection limits are specified following the U.S. EPA protocol of 99.7% confidence level.[1] Individual LODs improve as a function of the square root of the testing time. The detection limits in Table 1 and Table 2 are based on a 180-second total analysis time, 120 seconds for the main filter and 60 seconds for the low filter. All detection limits listed are in parts per million (ppm) unless otherwise stated.

Table 1 shows the limits of detection (LODs) using the Niton XL2 700 Series analyzer for specific metal matrices as the density of a matrix directly influences the detection limits.

Limits of Detection					
Time	**120s main filter / 60s low filter**				
Matrix	**Al**	**Fe**	**Cu**	**Zn**	**Sn**
Ba	50	240	390	440	2540
Sb	20	80	130	150	480
Cd	10	40	70	80	270
Pb	10	60	70	90	90
Br	20	80	140	1360	130
Se	10	20	30	120	30
Hg	10	70	110	1560	70
Cr	170	110	130	200	580

Table 1: Niton XL2 700 Series LODs for EN 71-3[2] elements in metal matrices

Limits of detection (LODs) are dependent on the following factors:

- Testing time
- Interferences/Matrix
- Level of statistical confidence

Please Note:

Ongoing research and advancements in our Niton XL2 analyzers will lead to continual improvement in many of the values detailed in this chart. Contact a Thermo Fisher Scientific office, or your local representatives for the latest performance specifications.

Please note that analysis time is based on your requirements, and, in most cases, shorter times will give you the detection limits you require. For example, if analysis time was reduced from 120 seconds to 30 seconds, then the detection limits obtained would be twice the values shown in the chart. Similarly, increasing the analysis time will reduce the detection limits by the square root of the increase factor.

1. *Definition and Procedure for the Determination of the Method of Detection Limit,* 40 CFR, Part 136, Appendix B. Revision 1.11. U.S. Environmental Protection Agency. U.S. Government Printing Office: Washington, DC, 1995.

2. *European Standard EN 71-3: 1994 + Amendment A1 : 2000 + Corregendum AC : 2002 Safety of Toys Part 3: Migration of certain elements*

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Tech Flash

Coatings Thickness Analysis Mode with Thermo Scientific Niton XRF Analyzers

Coatings Thickness Analysis Mode

In addition to alloy identification and composition analysis of metal coatings and substrates, Thermo Scientific™ Niton™ analyzers are capable of at-line coatings thickness or coating weight analysis. The in-process measurement of metal coating thickness is often necessary for quality and cost control. Niton handheld XRF coatings analysis offers metal finishers the advantage of nondestructive at-line testing, eliminating the time-consuming process of cutting samples and sending them to the laboratory for analysis. Both single layer and multilayer coatings can be analyzed.

Typical applications include:

- Galvanized zinc over steel
- Phosphorus over steel
- Zinc or zinc alloy over steel
- Hard chrome over steel
- Electroless nickel over steel
- Chrome/nickel/copper over steel, Zamak™ or plastic
- Dacromet® coating over steel

Metal Coatings mode is an optional mode, available for all the XL2 and XL3t models, with the exception of the XL2-100. For light elements coatings, such as phosphate or alumina coatings, the Niton 9XX series SDD-based instrument is required.

Metal Coatings Element Suites

Model	Standard Element Suite
XL2 PIN models	Sb Sn Pd Ag Mo Nb Zr Pb Au Pt Zn Cu Ni Co Fe Mn Cr V Ti Al[1]
XL3t PIN models	Sb Sn Cd Pd Ag Mo Nb Zr Pb Au Pt Zn Cu Ni Co Fe Mn Cr V Ti Al[1]
XL2 & XL3t SDD models	Sb Sn Cd Pd Ag Mo Nb Zr Pb Au Pt Zn Cu Ni Co Fe Mn Cr V Ti Al S P Si Mg

[1]Al only as substrate

To Access Coatings Thickness Mode

Figure 1
Select Sample Type

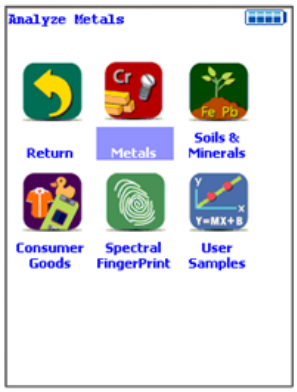

Figure 2
Select Metals mode

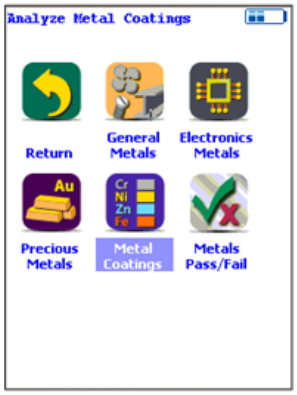

Figure 3
Select Metal Coatings

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To Change the Active Coating System

Note: Coatings Entry list includes only methods that have been created by the user.

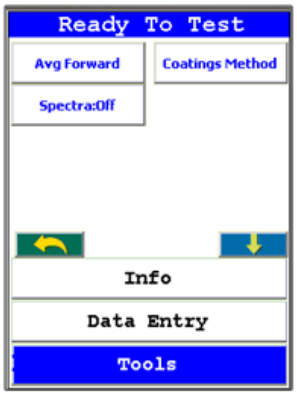

Figure 4
Select Tools/Coatings Method

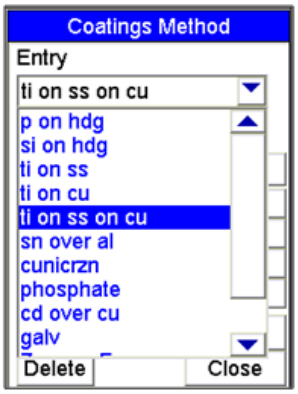

Figure 5
Select method from the Entry list

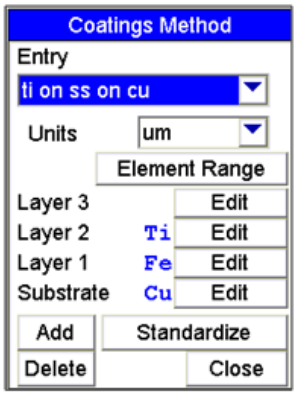

Figure 6
Select Close to return measurement screen

To Create a New Coating System

Before you can analyze for thickness, you have to create a Coatings System Entry and define the coatings system (Figures 7 -13). Note that the coatings method menu can be accessed via the steps outlined in Figures 1-6 above.

When creating a coating system, click “add” to activate the virtual keyboard and enter the name of a coating system (i.e. Cu over Fe). Once the name is created, select the unit (coating thickness or coating weight), substrate (type of metal to be coated) and metal coatings from the individual pull-down menus. Note: Some plastic substrates may be done by choosing Al as the substrate.

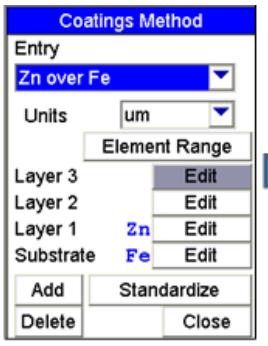

Figure 7
Select Add to create a new method

Figure 8
Enter name of the method

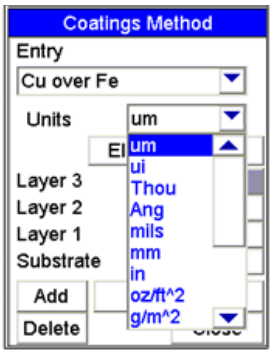

Figure 9
Select preferred unit from the Units list

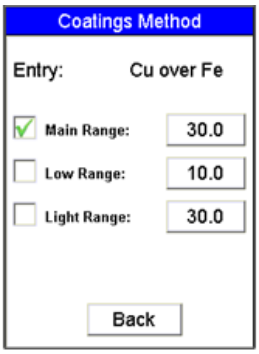

Figure 10
Adjust element range if necessary

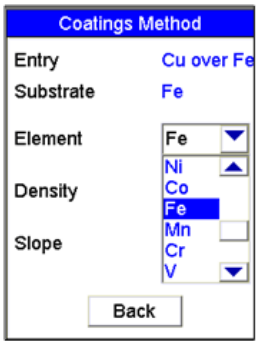

Figure 11
Select Substrate

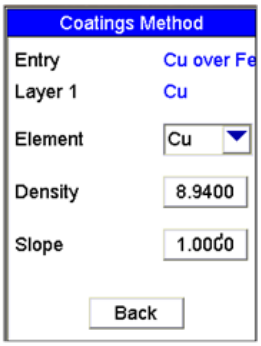

Figure 12
Select Layer 1

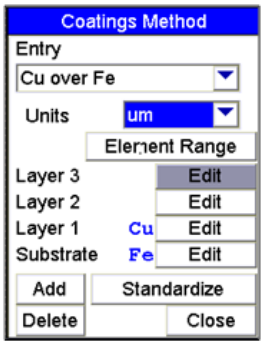

Figure 13
Completed Coating System setup

Standardize Feature

The Standardize feature is a single point standardization routine that corrects for any bias when compared to another analytical technique (e.g. bench-top X-ray, strip and weight or Eddy current; see Fig 14-17). To perform standardization, you must introduce a single known sample for analysis and enter the known thickness value for that sample. The sample used should be consistent with the target thickness value for your customer application. Following the analysis of that sample, the slope is calculated based on three data points – zero thickness (which has known response), infinite thickness (which also has a known response), and the value and response of the measured sample. This provides the basis for a very accurate calibration in the target thickness range. Once the standardization measurement is finished, you can either accept or reject the new slope calculation (Fig 17).

Infinite Thickness

There is a maximum coating thickness that can be measured. This maximum value, known as “infinite thickness,” varies with each coating element. If a coating above this value is measured, the analyzer will give the message “Saturated.” Typical infinite thickness values are given in Table 1.

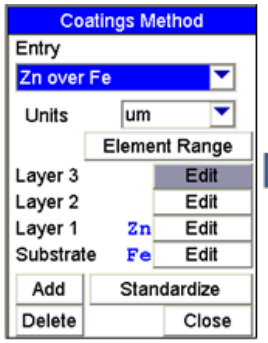

Figure 14
Select Standardize

Figure 15
Enter known thickness and mark Standardize checkbox

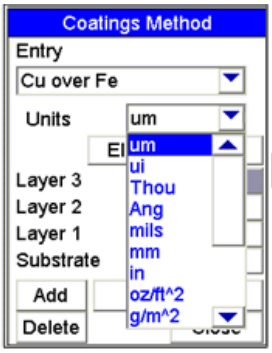

Figure 16
Return to measurement screen to measure the standardization sample

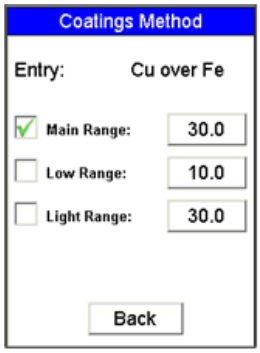

Figure 17
Save new slope

Element	Maximum Thickness	
	Microns	Mils
Au	10	0.4
Pt	15	0.6
Cr	15	0.6
Ni	20	0.8
Cu	20	0.8
Ti	50	2.0
Zn	50	2.0
Co	50	2.0
Mo	50	2.0
Zr	70	2.8
Cd	75	3.0
Sn	100	3.9

Table 1 Maximum coating thickness (infinite thickness) of various elements

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Thermo Scientific Niton XL2 500/600 Series Mining/Environmental Analyzers

Elemental Limits of Detection in SiO_2 and SRM Matrices Using Soil Analysis

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AN44818 11/2009

The Niton® XL2 500/600 Series x-ray fluorescence (XRF) analyzer is the solid value choice for your toughest testing applications. Where low detection limits and high sample throughput are critical, our perfect combination of hardware, software, and direct industry experience are combined to provide you with a solution to your most difficult analytical requirements. The chart below details the sensitivity, or LODs[1], of the Niton XL2 500/600 using Soil Analysis for an SiO_2 matrix, a typical soil matrix (SiO_2 with Ca/Fe), and SRM matrix. Soil Analysis offers optimum performance for low levels of RCRA metals and other contaminants/constituents found in soil/mineral type samples.

Limits of Detection in ppm (mg/kg)			
Time	**60s per filter**		
Matrix	**SiO_2**	**Soil**	**SRM**
Ba	90	100	100
Sb	40	45	45
Sn	40	45	45
Cd	20	25	25
Ag	10	15	15
Pd	10	15	15
Zr	20	20	20
Sr	10	10	15
Rb	10	10	15
Pb	10	10	12
Se	10	10	10
As	10	13	15
Hg	10	13	15
Au	20	20	22
Zn	10	16	25
W	60	60	80
Cu	20	25	30
Ni	50	65	75
Co	30	240	250
Fe	40	N/A	N/A
Mn	60	90	130
Cr	50	65	80
V	30	50	110
Ti	70	120	300
Sc	40	160	175
Ca	160	N/A	N/A
K	210	325	N/A
S	2010	3000	3600

Table 1: Element list shown is not exhaustive. For limits of detection for elements not shown, please contact a Thermo Fisher Scientific office, or your local representative.

Limits of detection (LODs) are dependent on the following factors:

- Testing time
- Interferences/Matrix
- Level of statistical confidence

Please Note:

Ongoing research and advancements in our Niton XL2 analyzers will lead to continual improvement in many of the values detailed in this chart. Contact a Thermo Fisher Scientific office, or your local representatives for the latest performance specifications.

Element detection limits shown for 60 second/filter analysis time in air path. Please note that analysis time is based on your requirements, and, in most cases, shorter times will give you the detection limits you require. For example, if analysis time was reduced to 15 seconds/filter, then the detection limits obtained would be twice the values shown in the chart. Similarly, increasing the analysis time will reduce the detection limits by the square root of the increase factor.

1. *Definition and Procedure for the Determination of the Method of Detection Limit,* 40 CFR, Part 136, Appendix B. Revision 1.11. U.S. Environmental Protection Agency. U.S. Government Printing Office: Washington, DC, 1995.

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