

SciAps X-200

LOD TABLE

Limits of Detection for
Geochemical Analyzers



SciAps Soils Test Stand sold separately

The Limits of Detection (LODs) table provides estimated detection limits for a range of samples. The LODs were obtained from tests on a variety of certified reference materials (CRMs). The lower end of the range represents the ideal case of an interference free sample matrix, in this case silicon dioxide. The lower limit is derived from multiplying the standard deviation of each element's result by 3 to achieve a statistical 99.7% confidence level.

The upper end of the range was derived from repeat measurements on a number of real world CRMs. The upper range values provide values for real world soil samples that are typical of many geological samples. Limits of detection may be higher depending on the concentration of specific interfering elements and or overall soil matrix density. Some common interferences are presented here.

X-200 Au Anode

Element	LOD Interference-free (SiO2)	LOD (Typical Sample)
BEAM 1 50 kV		
Ag	1	2
Cd	2	2
Sn	3	4
Sb	3	5
Te	7	8
Ba	12	18
La	17	20
Ce	45	60
Pr	115	135
Nd	120	150
BEAM 2 40 kV		
Mn ¹	13	15
Fe	7	8
Co ²	3	30
Ni	4	5
Cu	3	5
Zn	1	3
W	10	12
Hg	2	3
Au	2	5
As	1	3
Se	1	2
Tl	2	3
Pb	2	3
Bi	1	3
Rb	1	2
U	1	6
Sr	1	2
Y	1	2
Zr	1	2
Nb	1	2
Th	1	5
Mo	1	2
BEAM 3 15 kV		
P	350	500
S	100	300
Cl	30	50
K	15	50
Ca	12	50
Ti	4	10
V	2	5
Cr	4	10

1. Moving Mn to Beam 3 will improve LOD
 2. Cobalt LOD is strongly dependent on iron concentration

Lead, Arsenic: Lead produces a strong interference for arsenic measurements, therefore the arsenic LOD will be elevated for high lead concentrations (more than 1,000 ppm of lead typically). The X-200 automatically subtracts the lead interference. The subtraction increases the statistical error of the arsenic measurement, and thus elevates the arsenic LOD. This is true of every XRF analyzer.

Titanium, vanadium, barium: Barium produces L-shell emissions that overlap with Ti and V. Therefore samples with elevated Ba concentrations (> 500 ppm typically) may produce false detects on Ti and V and also elevated LODs for these elements.

Iron, Cobalt: The cobalt LOD will be higher in real world samples due to a strong Fe interference. Most real world soil samples contain 2-5% Fe or more.

Gold Analysis: Gold naturally forms microscopic “nuggets” and is not homogenous. Gold has several interferences, most notably As, Zn, W and Se. These elements, if present, will elevate the LOD for Au and may produce false positives. SciAps offers two options for Au exploration. We offer a pathfinder suite of elements fully calibrated. Also, the Z-300 handheld LIBS analyzer uses a 50 um laser beam, with internal sample viewing camera. Users may analyze ONLY the gold “lump” in the material in this case.



The intuitive power of an app based analyzer offering the same user feel of a Smartphone.

SciAps X and Z series analyzers allow for Android phone remote monitoring and downloading of results, in real time.

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YouTube

See X-200 Series videos
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