

DELTA Professional

Limits of Detection (LOD) for Soil Samples

The DELTA Professional is the value leader for performance in the DELTA product line. The DELTA Professional is offered with three tube anode materials. The various anode materials each have specific advantages. Which is best for a given application depends on the elements of interest.

The chart on the right gives a consistent comparison across tube anode materials. Best performance results from a combination of Soil and GeoChem modes are listed.

The silica matrix LODs are presented as a range to better represent typical performance. The low end of the LOD range represents the theoretical value for interference free samples using the LOD definition of 3 times the statistical noise. However, all samples are not "interference free." The upper end of the range represents samples with more challenging compositions and may be more representative of the samples that are environmentally common. This higher end of the LOD range is based on repeatability testing across standards with varying composition.

The determination of Limits of Detection (LODs) for any method of analysis depends on a number of factors.

- The LODs reported here are based on automatically selected beam conditions (kV, μ A, and filter settings) and a measurement time of 120 seconds per beam.
- A variety of certified soil standards were tested.
- Actual working samples may contain interfering elements so the actual working LODs for some "real-world" samples may be higher than those presented here.
- The commonly accepted level for the Limit of Quantification (LOQ) or ability to quantify the concentration of an element is 10 times the statistical noise.
- Only commonly occurring elements are listed. The DELTA is capable of measuring many other elements.
- All values from Soil mode except where noted as GeoChem.
- Common, well-known inter-element interferences for are:
 - High levels of Fe can interfere with low levels of Cr,
 - High levels of Ti can interfere with low levels of Ba,
 - High levels of Pb can interfere with low levels of As
 - Rh tube anode can interfere with low levels of Cl
 - Ag tube anode can interfere with low levels of Ag

	DPO-2000	DPO-4000	DPO-6000
Anode	Rh	Ta / Au	Ag
Element	LOD Range (ppm)	LOD Range (ppm)	LOD Range (ppm)
Mg*	5000-16500	N/A	10000-33000
Al*	650-2200	6800-23000	1500-5000
Si*	300-1000	1700-5500	500-1700
P*	50-175	200-650	70-220
S*	60-200	145-450	70-220
Cl	–	50-90	60-110
K	35-70	25-55	25-55
Ca	30-50	15-40	15-40
Ti	5-10	4-10	4-10
V	1-10	1-5	1-5
Cr	3-10	2-9	3-10
Mn	5-8	3-7	3-7
Fe	10-20	5-20	7-20
Ni	5-10	4-10	4-10
Cu	5-8	3-7	3-7
Zn	3-5	1-3	2-5
W	5-10	4-10	5-10
As	2-4	1-3	1-3
Hg	2-4	2-5	2-4
Se	1	1	1
Pb	3-5	2-5	2-4
Th	4-8	3-8	3-8
Rb	1	1	1
U	3-7	2-6	3-7
Sr	1	1	1
Y	1	1	1
Zr	2-4	1	1
Mo	2-4	1	1
Ag	7-12	5-10	–
Cd	12-15	6-9	8-15
Sn	15-25	8-13	10-15
Sb	17-25	10-13	12-15

*GeoChem Mode