

## APPLICATION NOTE

# Montana I Soil, NIST 2710a

## SUMMARY

The application note summarizes the digestion of NIST 2710a, a Montana soil standard reference material using ColdBlock™ Digestion Pro Series Technology.

**Instrument:** ColdBlock CBM, chiller, ICP-OES, ICP-MS (with CRC technology)

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**Digestion Time:** 45 minutes

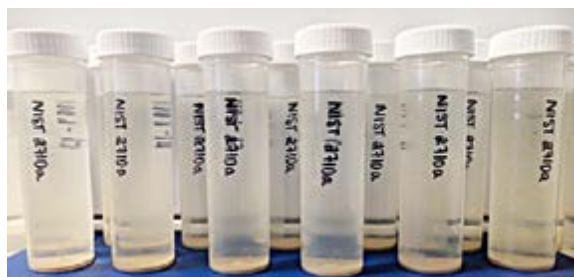
**Acid Used:** HNO<sub>3</sub>, HCl & H<sub>2</sub>O<sub>2</sub>

**Average ColdBlock Recovery vs. CRM:**

- 97% Arsenic
- 98% Cadmium
- 100% Lead

## METHODOLOGY

1. Chiller temperature was set to -5°C
2. 0.5g of each sample was weighed and placed into a ColdBlock™ Digestion vessel
3. 10mL of 1:1 HNO<sub>3</sub> + 5mL 1:1 HCl was added, and the samples were digested at 70% power for 5 minutes
4. 10mL HNO<sub>3</sub> was added and digested again at 60% power for 20 minutes (repeat this step if fuming continues)
5. 3mL of 30% H<sub>2</sub>O<sub>2</sub> was added slowly, and digested again at 60% for 10 minutes
6. Add 5mL HCl and digest a final time at 60% power for 10 minutes
7. Samples were cooled and bulked to 50mL using ultrapure water



16 samples of NIST 2710a after bulk up to 50mL

## DISCUSSION

- This method yielded data comparable to EPA 3050b standards (with improved recovery of antimony) in just 45 minutes.
- The addition of HCl in the final step of the digestion helps keep certain elements such as antimony and silver solubilized
- This method is not appropriate for standard ICP-MS instruments that are not equipped with Collision/Reaction Cell technology, for more detailed information please contact ColdBlock at [info@coldblock.ca](mailto:info@coldblock.ca)

## Results

Montana I Soil, NIST 2710a					
Method:	0.5g - 10mL 1:1 HNO <sub>3</sub> + 5mL 1:1 HCl, digest at 70% for 5 minutes, then add 10mL HNO <sub>3</sub> and digest at 60% for 20 minutes (repeat this step if fuming continues) Add 3mL of 30% H <sub>2</sub> O <sub>2</sub> , slowly and digest again @ 60% for 10 minutes, then add 5mL HCl and digest again @ 60% for 10 minutes. Cool and bulk to 50mL with 2% HNO <sub>3</sub>				
Element	*Reference Value EPA 3050b	ColdBlock Average (ppm) n=16	ColdBlock Stdev	ColdBlock % RSD	ColdBlock % Recovery vs EPA Method
Ag (ppm)	36	37	0.90	2.4%	103%
Al (ppm)	13220	14414	366	2.5%	109%
As (ppm)	1568	1524	33	2.2%	97%
Ba (ppm)	504	540	14.1	2.6%	107%
Be (ppm)	0.56	0.55	0.03	5.5%	98%
Ca (ppm)	1876	1887	84	4.5%	101%
Cd (ppm)	11.2	11	0.28	2.5%	98%
Co (ppm)	4.23	4.37	0.36	8.2%	103%
Cu (ppm)	3252	3388	80	2.4%	104%
Fe (ppm)	35687	36200	847	2.3%	101%
K (ppm)	4829	4914	116	2.4%	102%
Mg (ppm)	3811	3671	77	2.1%	96%
Mn (ppm)	1652	1665	37	2.2%	101%
Mo (ppm)	7.38	7.66	0.35	4.6%	104%
Na (ppm)	621	635	42	6.6%	102%
Ni (ppm)	6	7	0.4	5.7%	117%
Pb (ppm)	5092	5074	101	2.0%	100%
Se (ppm)	1.0	1.1	0.09	8.2%	110%
Sb (ppm)	10.1	29.1	3.41	11.7%	288%
Tl (ppm)	0.72	0.9	0.06	6.7%	125%
V (ppm)	46	48	1.4	2.9%	104%
Zn (ppm)	3852	3834	77	2.0%	100%

\* Michelle Briscoe<sup>1</sup>, Agustin Pierr<sup>2</sup>, Katie Adams<sup>3</sup>, Ben Wozniak<sup>1</sup>, and Lydia Greaves<sup>1</sup>. (Aug 2020) "A Collaborative Approach to Updating EPA Method 3050, [power point slide 22 of 26] Brooks applied labs. <https://apps.nelac-institute.org/>