

APPLICATION NOTE

Metals in Sewage SludG™, ERA 160

SUMMARY

The application note summarizes the digestion of ERA 160, a Metals in Sewage Sludge certified reference material using ColdBlock Digestion Pro Series Technology.

Instrument:	ColdBlock CBM, chiller, ICP-OES, ICP-MS (with CRC technology)
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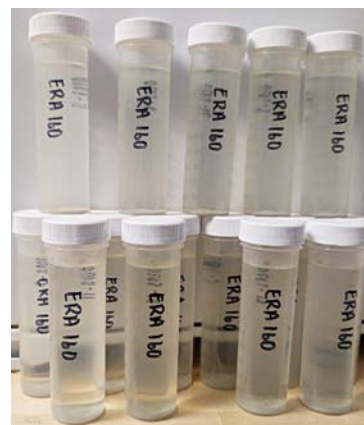
Digestion Time:	45 minutes
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Acid Used:	HNO ₃ , HCl & H ₂ O ₂
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Average ColdBlock Recovery vs. CRM:	<ul style="list-style-type: none">■ 107% Arsenic■ 103% Mercury■ 105% Selenium
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METHODOLOGY

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 HNO₃ + 5mL 1:1 HCl were added, and the samples were digested at 70% power for 5 minutes
4. 10mL HNO₃ was added and digested again at 60% power for 20 minutes (repeat this step if fuming continues)
5. 3mL of 30% H₂O₂ was added slowly, and digested again at 60% for 10 minutes
6. 5mL HCl was added and digested at 60% power for 10 minutes
7. Samples were cooled and bulked to 50mL using ultrapure water



15 samples of ERA 160 after bulk up to 50mL

DISCUSSION

- This method yielded data comparable to EPA 3050B standards 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

Results

ERA #160 Metals in Sewage SludG (lot:D122-160)

Method:	0.5g - Add 10mL 1:1 HNO ₃ + 5mL 1:1 HCl, digest at 70% for 5 minutes, then add 10mL HNO ₃ and digest at 60% for 20 minutes (repeat this step if fuming continues) Add 3mL of 30% H ₂ O ₂ , 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 ultrapure water				
Element	*Reference Value (mg/kg) n=5	ColdBlock Average (mg/kg) n=16	ColdBlock Stdev	ColdBlock % RSD	ColdBlock % Recovery vs SW-846 3050B
Aluminum	3228	3427	42.10	1.2%	106%
Antimony	108	124	4.16	3.4%	115%
Arsenic	127	136	1.89	1.4%	107%
Barium	698	718	23.6	3.3%	103%
Beryllium	78.3	80.5	2.90	3.6%	103%
Cadmium	86.7	85.4	2.71	3.2%	99%
Calcium	39519	40469	1524.6	3.8%	102%
Chromium	72.4	74.7	1.72	2.3%	103%
Cobalt	9.9	10.2	0.19	1.9%	103%
Copper	812	809	19.1	2.4%	100%
Iron	23934	24802	811.03	3.3%	104%
Lead	105	110	2.33	2.1%	104%
Magnesium	3261	3365	135	4.0%	103%
Manganese	558	595	16.0	2.7%	107%
Mercury	53.6	55.0	2.22	4.0%	103%
Molybdenum	96.5	92.7	2.71	2.9%	96%
Nickel	47.7	49.0	1.74	3.5%	103%
Potassium	4293	4279	117.7	2.8%	100%
Selenium	65.7	68.8	1.95	2.8%	105%
Silver	89.3	90.1	1.81	2.0%	101%
Sodium	2986	3177	96.17	3.0%	106%
Thallium	100	102	0.943	0.9%	102%
Vanadium	37.0	39.1	0.87	2.2%	106%
Zinc	821	758	24.2	3.2%	92%