

APPLICATION NOTE

Digestion of Metals in Sewage Sludge, SQC001S

SUMMARY

The application note summarizes the digestion of Metals in Sewage Sludge, SQC001S, a Certified Reference Material using ColdBlock™ Digestion CB15S Technology.

Instrument: ColdBlock CB15S sample digester, chiller, ICP-OES, ICP-MS

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Digestion Time: 30 Minutes

Acid Used: HNO₃ & HCl

Average ColdBlock Recovery vs. CRM:

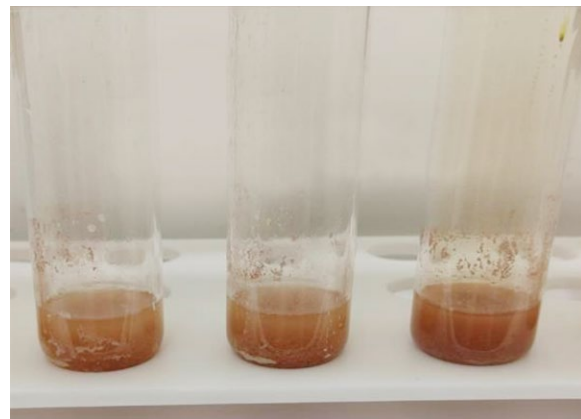
- 101% Arsenic
- 99% Cadmium
- 106% Lead

METHODOLOGY

1. Chiller temperature was set to -5 °C
2. 0.5g of Sewage Sludge was weighed and placed into a ColdBlock™ Digestion vessel
3. 7ml HNO₃ was added, and mixed with sample
4. Sample was digested at 70% power for 10 minutes
5. 7mL HCl was added, and sample was digested again at 70% power for 20 minutes
6. Sample was cooled and bulked to 50mL using 2%HNO₃ +0.5% HCl v/v

DISCUSSION

- Upon addition of HNO₃, the evolution of reddish brown (NO₂) fumes might occur
- The NO₂ subsided and turned white prior to the addition of HCl
- After 30 minutes the samples are reddish brown, and some solid material remains
- Longer digestion times can be used to improve the recoveries of certain elements



SQC001 after digestion completed

Metals in Sewage Sludge, SQC001S is a Certified Reference Material used for QC verification and/or method development purposes.

Digestion of Metals in Sewage Sludge, SQC001S

Results

Table: SQC001S – Metals in Sewage Sludge – CRM

Method:	0.5g	7mL HNO3 Digest 600 seconds at 70%, add 7mL HCl and digest again at 70% for 1200 seconds				
Element	Certified Value (mg/kg)	Uncertainty (+/-)	ColdBlock Average (mg/kg)	Stdev (mg/kg)	% RSD	% Recovery
Aluminum	18800	3120	16354	52.18	0.30%	87%
Antimony	70.8	24	70.7	0.07	0.10%	100%
Arsenic	282	35.9	285	6.82	2.40%	101%
Barium	430	40.7	430	26.9	6.30%	100%
Beryllium	45.1	4.8	42.6	0.63	1.50%	94%
Cadmium	64.4	5.2	63.8	0.19	0.30%	99%
Calcium	66200	8280	58085	266.99	0.50%	88%
Chromium	116	14.6	128	1	0.80%	110%
Cobalt	49.3	4.39	48.9	0.5	1.00%	99%
Copper	416	33.8	420	6.78	1.60%	101%
Iron	33900	5630	32204	67.85	0.20%	95%
Lead	126	10.5	134	0.18	0.10%	106%
Magnesium	13200	1110	12625	249.96	2.00%	96%
Manganese	1310	350	1219	112.1	9.20%	93%
Mercury	6.06	1.44	5.6	0	0.00%	92%
Nickel	106	6.42	120	0.22	0.20%	113%
Potassium	4330	161	4130	108.95	2.60%	95%
Selenium	146	18.6	139	1.5	1.10%	95%
Silver	42.3	5.5	39.5	0.9	2.30%	93%
Sodium	3100	304	2955	122.18	4.10%	95%
Thallium	40.9	10.9	42.6	0.25	0.60%	104%
Vanadium	105	15.8	112	1	0.90%	107%
Zinc	913	82.8	889	10.5	1.20%	97%