

APPLICATION NOTE

GBMS304-4- Multi Element

SUMMARY

The application note summarizes the digestion of GBMS304-4, a multi-element Certified Reference Material using ColdBlock™ Digestion Pro Series Technology.

Instrument:	ColdBlock CBM sample digester, chiller, HF compatible liners, ICP-MS & ICP-OES
Published:	January 2023
Digestion Time:	30 Minutes
Acid Used:	Aqua Regia, HF & H ₃ BO ₃
Average ColdBlock Recovery vs. CRM:	<ul style="list-style-type: none">■ 96% Silver■ 103% Arsenic■ 99% Sulfur

METHODOLOGY

1. Chiller temperature was set to -5°C
2. 0.25g of each sample was weighed and placed into a ColdBlock™ Digestion vessel
3. 20 mL of Aqua Regia + 3 mL HF was added
4. Sample was digested at 80% power for 20 minutes
5. 20mL of 4%_{v/v} Boric acid was added
6. Samples were digested again at 80% power for 10 minutes
7. Samples were cooled and bulked to 50mL using 2% HNO₃ + 0.5% HCl_{v/v}

DISCUSSION

- The addition of Boric acid will help re-solubilize any insoluble fluorides and will help neutralize any remaining HF in solution
- If Silver precipitates out of solution as AgCl, bulk up with >20% HCl_{v/v}
- If the Sulfide content of your sample is > 10 wt.% - reverse the ratios of Aqua Regia and use 1:3, HCl:HNO₃ - always add the Nitric acid first (reddish brown NO₂ fumes might form)



Prior to homogenization and testing, this material was sourced from Cu / Au sulphidic ore
geostats.com.au

GBMS304-4; Multi-element; Geostats Pty Ltd, Mining Industry Consultants; O'Connor, Western Australia (April, 2004)

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Results

Geostats - GBMS304-4- Multi Element										
Method:	0.25g	20mL reverse Aqua Regia + 3 mL HF digested at 80% for 20 minutes, add 20mL of 4% Boric Acid - and digest again at 80% for another 10 mins								
Element	Geostats Certified 4-acid Value (ppm)	95% Confidence Limits		Sample A	Sample B	Sample C	Average (ppm)	Stdev	% RSD	% Recovery vs certified 4-acid value
		Low	High							
Ag	3.4	3.3	3.5	3.03	3.15	3.58	3.25	0.24	7.3%	96%
As	535	527.6	542.4	533	553	560	548	11.39	2.1%	103%
Co	350	346	354	355	360	370	362	6.14	1.7%	103%
Cu	9786	9731.8	9840.2	9806	9989	10187	9994	155.42	1.6%	102%
Pb	271	268.4	273.6	320	319	324	321	2.07	0.6%	118%
Ni	732	724.7	739.3	792	782	762	779	12.47	1.6%	106%
S	62700	62200	63200	61348	61222	62724	61765	680.22	1.1%	99%
Zn	149	147	151	146	147	149	147	1.25	0.8%	99%