ColdBlock™ Technologies Inc.

APPLICATION NOTE

Tungsten-Copper-Gold-Magnetite Ore OREAS 700

SUMMARY

The application note summarizes the digestion of OREAS 700, a tungsten-copper-gold-magnetite ore, using ColdBlock™ Digestion Pro Series Technology.

Instrument:	ColdBlock CBM Pro Series, chiller, ICP-OES
Published:	June 2025
Digestion Time:	35 Minutes
Acid Used:	HNO_3, HCl, HF & H_3BO_3
Average ColdBlock Recovery vs. CRM:	■ 100% copper ■ 100% iron ■ 104% tungsten

METHODOLOGY

1. Set the chiller temperature to -5°C.
2. Weigh 0.25 g of each sample and transfer into a ColdBlock™ Digestion vessel
3. Add 20 mL of aqua regia (add HNO_3 first, followed by HCl) and 3 mL of HF to each vessel.
4. Digest samples at 80% power for 20 minutes.
5. Add 20 mL of 4% boric acid ($_{w/v}$) to each sample.
6. Digest samples again at 80% power for 10 minutes.
7. Add 5 mL of HCl.
8. Digest at 100% power for 5 minutes.
9. Cool the samples and adjust the volume to 50 mL with DI water.

OREAS 700 was prepared from skarn tungsten-magnetite ore from the White Rock W-Sn deposit located in NSW, Australia with the addition of a minor quantity of Cu-Au concentrate. OREAS 700; Tungsten Copper Gold Magnetite Ore; Certificate of Analysis OREAS, Ore Research & Exploration Pty Ltd; Victoria, Australia (July 2014) Retrieved from: www.oreas.com/

DISCUSSION

- The addition of boric acid aids in the re-solubilization of insoluble fluorides and neutralizes residual hydrofluoric acid (HF). This step is crucial for sample dissolution and minimizing analyte loss during digestion.
- Following the digestion process, the samples were slightly yellow and visibly clear, indicating that the majority sample matrix had dissolved.

Results

Tungsten-Copper-Gold-Magnetite Ore OREAS 700					
Method:	0.25g - Add 20mL aqua regia + 3mL HF and digest at 80% power for 20 minutes. Add 20mL of 4% boric acid $_{w/v}$ and digest again at 80% power for 10 minutes. Add 5mL HCl, and digest again for 5 minutes. Let cool, and adjust the volume to 50mL with DI water.				
Element	OREAS Certified Values	ColdBlock Average	ColdBlock SD +/-	ColdBlock RSD	Recovery vs Certified Value
Al (%)	5.57	5.46	0.06	1.2%	98%
As (ppm)	4.35	<5	N/A	N/A	N/A
Ba (ppm)	158	152	1.81	1.2%	96%
Ca (%)	5.55	5.50	0.10	1.8%	99%
Co (ppm)	16.8	17.4	0.53	3.0%	104%
Cr (ppm)	47.2	47.2	0.42	0.9%	100%
Cu (%)	0.202	0.203	0.003	1.5%	100%
Fe (%)	15.57	15.55	0.14	0.9%	100%
K (%)	1.57	1.53	0.008	0.5%	97%
Li (ppm)	223	217	2.87	1.3%	97%
Mg (%)	0.995	0.990	0.008	0.8%	99%
Mn (%)	0.314	0.306	0.004	1.3%	97%
Mo (ppm)	81	81	3.25	4.0%	100%
Na (%)	1.21	1.16	0.02	1.7%	96%
Ni (ppm)	24.1	27.0	2.14	7.9%	112%
P (%)	0.347	0.341	0.005	1.5%	98%
Pb (ppm)	6.83	<10	N/A	N/A	N/A
S (%)	0.295	0.301	0.002	0.7%	102%
Sb (ppm)	0.7	<10	N/A	N/A	N/A
Sn (ppm)	133	129	2.29	1.8%	97%
Sr (ppm)	124	120	1.33	1.1%	97%
Ti (%)	0.179	0.168	0.002	1.2%	94%
V (ppm)	62	65	0.88	1.4%	105%
W (%)	0.989	1.027	0.103	10.0%	104%
Zn (ppm)	216	220	3.34	1.5%	102%
Zr (ppm)	47.3	50.1	0.43	0.9%	106%

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