

## APPLICATION NOTE

# AMIS 0566 – Copper Concentrate

## SUMMARY

The application note summarizes the digestion of AMIS 0566, a Copper Concentrate Certified Reference Material using ColdBlock™ Pro Series CBM Technology.

<b>Instrument:</b>	ColdBlock CBM sample digester, chiller, HF compatible liners, ICP-MS & ICP-OES
<b>Published:</b>	January 2023
<b>Digestion Time:</b>	30 Minutes
<b>Acid Used:</b>	Aqua Regia, HF & H <sub>3</sub> BO <sub>3</sub>
<b>Average ColdBlock Recovery vs. CRM:</b>	■ 99% Arsenic ■ 98% Bismuth ■ 99% Copper ■ 99% Selenium

## 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 reverse Aqua Regia was added
4. Samples were digested at 80% power for 20 minutes
5. 20mL of 10%<sub>v/v</sub> 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% HNO<sub>3</sub> + 0.5% HCl<sub>v/v</sub>

## 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 >10% HCl<sub>v/v</sub>
- If the Sulfide content of your sample is > 10 wt.% – reverse the ratios of Aqua Regia and use 1:3, HCl:HNO<sub>3</sub> – always add the Nitric acid first (reddish brown NO<sub>2</sub> fumes might form)



AMIS 0566 after bulk-up

The Didipio Gold-Copper Project is in the north of Luzon Island in the Philippines.

The deposit lies within the Dinkidi stock in the Didipio Igneous Complex, a massive alkalic intrusive body. Regionally, the geology consists of late Miocene aged volcanic, volcanoclastic, intrusive and sedimentary rocks that are hosted above a sequence of pre-tertiary aged tonalite and schist.

amis.co.za

AMIS0566; Copper concentrate from the Philippines; AMIS Matrix Reference Materials; A part of Torre Industries: Gauteng, South Africa

## AMIS 0566 – Copper Concentrate

## Results

AMIS 0566 – Copper Concentrate										
Method:	.025g	20mL reverse Aqua Regia + 3 mL HF digested at 80% for 20 minutes, add 20mL of 10% Boric Acid – and digest again at 80% for another 10 mins								
Element	AMIS Certified 4-acid Value (ppm)	95% Confidence Limits		Sample A	Sample B	Sample C	Average (ppm)	Stdev	% RSD	% Recovery vs 4-acid value
		Low	High							
Ag	77	69	85	74	80	76	76.7	2.26	2.9%	100%
Al	16100	15100	17100	15687	15339	15593	15539.7	146.99	0.9%	97%
As	67	56	78	69	64	66	66.2	1.86	2.8%	99%
Ba	237	186	288	250	238	236	241.4	5.89	2.4%	102%
Bi	46	41	51	46	45	45	45.2	0.59	1.3%	98%
Ca	6263	5836	6690	6135	6078	6022	6078.2	46.33	0.8%	97%
Cd	2	1.9	2.1	2	2	2	2.2	0.17	7.6%	112%
Ce	5	4	6	5	5	5	5.3	0.09	1.8%	105%
Co	48	41	55	48	45	45	45.9	1.46	3.2%	96%
Cu	217100	207100	227100	215457	212850	218439	215581.8	2283.63	1.1%	99%
Ga	4	3	5	4	4	4	3.8	0.05	1.2%	96%
In	1	1	1	1	1	1	1	0.00	0.3%	102%
K	8498	8226	8770	8350	8072	8390	8270.7	141.44	1.7%	97%
La	2	1	3	2	2	2	2.2	0.05	2.1%	112%
Mg	5077	4421	5733	5107	5063	5063	5077.5	20.66	0.4%	100%
Mn	151	129	173	153	147	151	150.3	2.62	1.7%	100%
Mo	87	78	96	91	92	93	92.1	1.15	1.3%	106%
Na	5941	5643	6239	6290	6155	6223	6222.7	55.11	0.9%	105%
Pb	242	214	270	239	239	232	236.7	3.30	1.4%	98%
Rb	14	11	17	15	15	15	14.9	0.20	1.3%	107%
*S	249400	231400	267400	249251	249396	242570	247072.4	3184.03	1.3%	99%
Se	422	318	526	426	405	417	416.1	8.39	2.0%	99%

## AMIS 0566 – Copper Concentrate

## Results

AMIS 0566 – Copper Concentrate										
Method:	.025g	20mL reverse Aqua Regia + 3 mL HF digested at 80% for 20 minutes, add 20mL of 10% Boric Acid – and digest again at 80% for another 10 mins								
Element	AMIS Certified 4-acid Value (ppm)	95% Confidence Limits		Sample A	Sample B	Sample C	Average (ppm)	Stdev	% RSD	% Recovery vs 4-acid value
		Low	High							
<b>Sb</b>	9	8.6	9.4	10	9	9	9.6	0.31	3.2%	106%
<b>Sr</b>	102	87	117	101	101	108	103.4	3.40	3.3%	101%
<b>Te</b>	41	36	46	40	42	41	41.2	0.85	2.1%	100%
<b>Th</b>	1	1	1	1	1	1	1	0.04	3.8%	99%
<b>V</b>	76	71	81	79	74	73	75.3	2.89	3.8%	99%
<b>Y</b>	2	2	2	2	2	2	2	0.05	2.4%	98%
<b>Zn</b>	251	230	272	254	242	251	248.7	5.22	2.1%	99%

\* Element certified by Combustion/LECO