ColdBlock™ Technologies Inc.

APPLICATION NOTE

# Copperbelt, Sulphide ZM - AMIS 0809

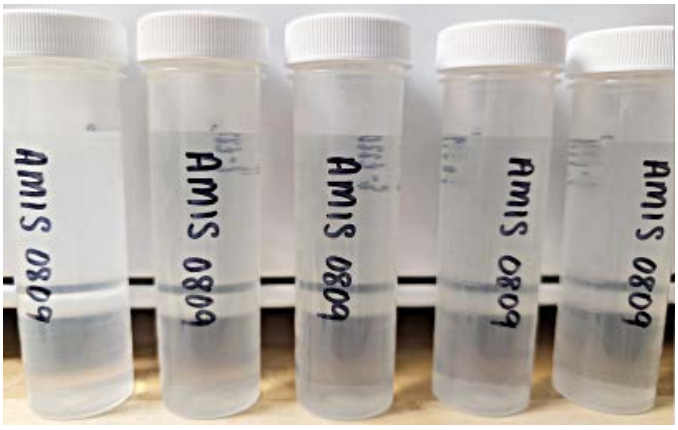
## SUMMARY

The application note summarizes the digestion of AMIS 0809, a Copperbelt sulphide ore from Zambia, 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:** | ■ 105% cobalt<br>■ 103% copper<br>■ 102% nickel |

## 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 reverse 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




*AMIS 0809 was made using sulphide ore sourced from the Kansanshi Mine, located in the Northwestern Province of Zambia.*

*African Mineral Standards (AMIS). (2022). Certificate of Analysis: AMIS0809 - Copperbelt, Sulphide Zambia. Retrieved from www.amis.co.za/*

## 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 visibly clear, indicating that the majority sample matrix had dissolved. A trace amount of sample material settled on the bottom of the tube overnight.

## Results

| Copperbelt, Sulphide ZM - AMIS 0809 | | | | | |
|---|---|---|---|---|---|
| Method: | 0.25g - Add 20mL reverse 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 | AMIS Certified Values | ColdBlock Average | ColdBlock Stdev +/- | ColdBlock RSD | ColdBlock Recovery vs Certified Value |
| Ag (ppm) | 0.6 | <1 | N/A | N/A | N/A |
| Al (%) | 1.04 | 1.00 | 0.02 | 1.8% | 96% |
| As (ppm) | 32 | 40 | 1.51 | 3.5% | 114% |
| Ba (ppm) | 21 | 20.6 | 0.44 | 2.1% | 98% |
| Be (ppm) | 0.2 | <0.5 | N/A | N/A | N/A |
| Bi (ppm) | 1 | <5 | N/A | N/A | N/A |
| Ca (%) | 18.15 | 17.97 | 0.21 | 1.2% | 99% |
| Cd (ppm) | 0.2 | <0.5 | N/A | N/A | N/A |
| Co (ppm) | 366 | 387 | 1.52 | 0.4% | 105% |
| Cr (ppm) | 99 | 98 | 2.41 | 2.5% | 99% |
| Cu (%) | 2.97 | 3.05 | 0.02 | 0.7% | 103% |
| Fe (%) | 5.69 | 5.94 | 0.08 | 1.4% | 104% |
| Mg (%) | 1.22 | 1.23 | 0.01 | 1.1% | 101% |
| Mn (ppm) | 1065 | 1065 | 8.61 | 0.8% | 100% |
| Mo (ppm) | 100 | 108 | 3.69 | 3.4% | 107% |
| Na (ppm) | 8796 | 8686 | 183 | 2.1% | 99% |
| Ni (%) | 310 | 317 | 5.23 | 1.6% | 102% |
| P (ppm) | 291 | 286 | 11.9 | 4.2% | 98% |
| Pb (ppm) | 29 | 30 | 3.23 | 10.1% | 101% |
| S (%) | 5.29 | 5.52 | 0.07 | 1.3% | 104% |
| Sb (ppm) | 2 | <5 | N/A | N/A | N/A |
| Sr (ppm) | 174 | 167 | 0.84 | 0.5% | 96% |
| Zn (ppm) | 75 | 71 | 0.67 | 0.9% | 95% |

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