

# Zinc Concentrate, CZn-4

## SUMMARY

The application note summarizes the digestion of CZn-4, a zinc concentrate certified reference material using ColdBlock Digestion Pro Series Technology.

**Instrument:** ColdBlock CBM Pro-Series, chiller, HF liners, ICP-OES

**Published:** May 2025

**Digestion Time:** 30 Minutes

**Acid Used:**  $\text{HNO}_3$ , HCl, HF &  $\text{H}_3\text{BO}_3$

**Average ColdBlock Recovery vs. CRM:**

- 102% lead
- 96% silver
- 101% zinc

## METHODOLOGY

1. Set the chiller temperature to  $-5^\circ\text{C}$ .
2. Weigh 0.25 g of each sample and transfer into a ColdBlock Digestion vessel with liner
3. Add 20 mL of aqua regia (add  $\text{HNO}_3$  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. Cool the samples and adjust the volume to 50 mL with DI water

## 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 sample matrix had dissolved. A trace amount of material settled on the bottom of the tube

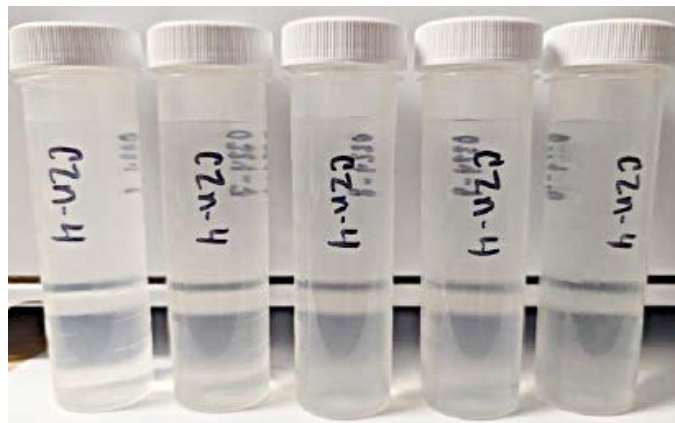


Figure 1- CZn-4 after bulking-up to 50mL

## Results

| CZn-4, Zinc Concentrate |                                                                                                                                                                                                                |                          |                        |                  |                                             |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------|------------------|---------------------------------------------|
| 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. Let cool, and adjust the volume to 50mL with DI water |                          |                        |                  |                                             |
| Element                 | CZn-4<br>Certified Values                                                                                                                                                                                      | ColdBlock Average<br>n=5 | ColdBlock<br>Stdev +/- | ColdBlock<br>RSD | ColdBlock<br>Recovery vs<br>Certified Value |
| Ag (µg/g)               | 51.4                                                                                                                                                                                                           | 49.1                     | 1.5                    | 3.1%             | 96%                                         |
| Al (%)                  | 0.0715                                                                                                                                                                                                         | 0.0740                   | 0.0030                 | 4.1%             | 103%                                        |
| As (%)                  | 0.0356                                                                                                                                                                                                         | 0.0342                   | 0.0007                 | 2.0%             | 96%                                         |
| Cd (%)                  | 0.2604                                                                                                                                                                                                         | 0.2713                   | 0.004                  | 1.3%             | 104%                                        |
| Co (µg/g)               | 93.5                                                                                                                                                                                                           | 99.3                     | 1.6                    | 1.6%             | 106%                                        |
| Cu (%)                  | 0.403                                                                                                                                                                                                          | 0.4032                   | 0.005                  | 1.2%             | 100%                                        |
| Pb (%)                  | 0.1861                                                                                                                                                                                                         | 0.1898                   | 0.0025                 | 1.3%             | 102%                                        |
| Fe (%)                  | 9.02                                                                                                                                                                                                           | 9.03                     | 0.08                   | 0.9%             | 100%                                        |
| S (%)                   | 33.07                                                                                                                                                                                                          | 32.36                    | 0.82                   | 2.5%             | 98%                                         |
| Se (µg/g)               | 86.7                                                                                                                                                                                                           | 83.8                     | 4.7                    | 5.6%             | 97%                                         |
| Zn (%)                  | 55.24                                                                                                                                                                                                          | 55.83                    | 0.81                   | 1.5%             | 101%                                        |

The material for CZn-4 was donated by Xstrata Copper Canada Division, Kidd Metallurgical Site in Timmins, Ontario Canada  
 CCRMP CanmetMINING NRCAN (2010). Certificate of Analysis for CZN-4, Zinc Concentrate <https://natural-resources.canada.ca/>