CCRMP
Canadian Certified Reference Materials Project

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# *Certificate of Analysis*

First issued: November 1996 Last revision: August 1997

# *CZN-3*

## Zinc Concentrate Reference Material

**Certified Values and 95% Confidence Intervals**

| Constituent | Certified Value | 95% C.I. |
|---|---|---|
| **Ag** | **45** µg/g | ± 2 µg/g |
| **As** | **0.039** % | ± 0.003 % |
| **Ca** | **0.058** % | ± 0.005 % |
| **Cd** | **0.248** % | ± 0.003 % |
| **Co** | **0.009** % | ± 0.001 % |
| **Cu** | **0.685** % | ± 0.008 % |
| **Fe** | **9.97** % | ± 0.08 % |
| **Mg** | **0.051** % | ± 0.001 % |
| **Pb** | **0.113** % | ± 0.003 % |
| **S** | **31.6** % | ± 0.4 % |
| **Zn** | **50.92** % | ± 0.08 % |

**Provisional Values and 95% Confidence Intervals**

| Constituent | Provisional Value | 95% C.I. |
|---|---|---|
| **Al** | **0.10** % | ± 0.01 % |
| **Hg** | **5** µg/g | ± 1 µg/g |
| **Mn** | **0.0096** % | ± 0.0006 % |
| **Ni** | **31** µg/g | ± 10 µg/g |
| **Sb** | **10** µg/g | ± 2 µg/g |
| **$SiO_2$** | **0.94** % | ± 0.06 % |

## Source

The raw material for CZN-3 is a currently-traded concentrate donated by Kidd Creek Division of Falconbridge Limited, Timmins, Ontario.

## Description

The product is a compositional reference material having primarily a sulphide matrix and a zinc concentration of 51 %.

## Intended Use

CZN-3 is intended for analysis of zinc, other majors and minors, including penalty elements, and trace elements in a zinc sulphide concentrate.

## Instructions for Use

CZN-3 should be used "as is" without drying, to duplicate conditions in the interlaboratory certification program.. Thermogravimetric analysis at CANMET showed a moisture content of 0.8%. The contents of the bottle should be thoroughly mixed before taking samples. After opening the sealed pouch, the bottle should be kept in a dessicator, or preferably, resealed under nitrogen to prevent oxidation. Bottles that have been left unsealed are prone to oxidation, which would, in time, cause a lowering of the concentration of the constituents. If CZN-3 is used for major element analysis, such bottles should be discarded and replaced with fresh stock.

## Method of Preparation

The raw material, in the form of fine powder, was shipped in three 150-kg lots to CANMET for processing.

Each lot was dried in batches and passed through primary and secondary crushers to breakdown agglomerates. Batches were re-dried at 150 °C for 5 h. The material was screened to -200 mesh. The oversize fraction was milled, in 25-kg batches, in a vibration energy mill, and screened to -200 mesh. The final -200-mesh product weighed 390 kg. CZN-3 was blended in a single lot in a conical blender that had been flushed with nitrogen, and bottled in 200-g units. Each bottle was sealed, under nitrogen, in a mylar-aluminum foil pouch to provide long-term protection against oxidation.

## State of Homogeneity

The homogeneity of the stock with respect to its zinc, cadmium, and lead contents was tested and confirmed at CANMET and Kidd Creek using bottles chosen according to a stratified random sampling scheme. Kidd Creek also determined iron, silver, copper and magnesium. Kidd Creek used titrimetric techniques for the determination of zinc and iron on 0.3-g and 1.0-g samples, respectively. For the other elements, they used a multi-acid digestion of a 0.3-g sample followed by ICP finish (AAS for silver on a 1.0-g sample). CANMET used 0.25-g samples for the titrimetric zinc determinations and a multi-acid digestion of 1-g samples for the ICP determination of cadmium and lead.

## Method of Certification

CZN-3 was certified by an interlaboratory analysis program. Forty-one industrial, commercial, and government laboratories participated in a free-choice of method interlaboratory certification program by providing analyses for zinc and many other elements. A statistical analysis of the data yielded a certified value for zinc and ten other major, minor and trace elements, including penalty elements. Provisional status was conferred on six other constituents and information ranges are reported for twelve more. Data for other elements are either inadequate or inconclusive, but are disclosed in the final report.

## Legal Notice

The Canadian Certified Reference Materials Project has prepared this reference material and statistically evaluated the analytical data of the interlaboratory certification program to the best of its ability. The purchaser, by receipt hereof, releases and indemnifies the Canadian Certified Reference Materials Project from and against all

liability and costs arising out of the use of this material and information.

## Reference

The preparation and certification procedures used for CZN-3, including values obtained by individual laboratories, are given in CANMET report *CCRMP 96-1E*. This report is available free of charge on application to:


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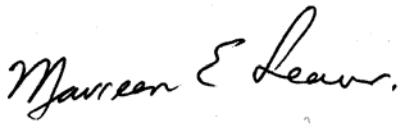
**Information Ranges**

| Constituent | Information Range |
|---|---|
| **Au** | 0.05 - 0.08 µg/g |
| **Ba** | 6 -14 µg/g |
| **C** | 0.09 - 0.12 % |
| **Bi** | 7 - 20 µg/g |
| **Cl** | 20 -70 µg/g |
| **Cr** | 6 - 10 µg/g |
| **F** | 0.001 - 0.008 % |
| **In** | 0.018 - 0.024 % |
| **La** | 2 - 7 µg/g |
| **Mo** | 2 - 20 µg/g |
| **Se** | 110 - 115 µg/g |
| **Sn** | 0.04 - 0.05 % |

## Certifying Officers

William S. Bowman



Maureen E. Leaver