

STATE OF ALASKA
Department of Natural Resources
DIVISION OF MINES AND GEOLOGY

LABORATORY NOTES NO. 2

Laboratory Test of Zinc in Water and Ice

By

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November 1968

LABORATORY TEST OF ZINC IN WATER AND ICE

STATEMENT OF PROBLEM

It was suggested that possibly geochemical sampling of ice or water during winter be considered. To this end, an experiment was designed to determine whether zinc is incorporated into the ice of zinc bearing water or whether it is excluded.

EXPERIMENTAL

Twenty-six ml of doubly deionized water was brought to 5 ppm zinc. The water was cooled in a vessel until about half of the volume was ice. The liquid was poured off and its volume measured. The ice portion was melted and its volume measured (liquid = 11 ml, melted liquid from the ice portion = 15 ml).

The zinc level in each portion was then determined by AAS.

RESULTS

The zinc level in the water fraction was found to be 11 ppm. The zinc level in the fraction that had been frozen was found to be 1 ppm.

This indicates that the freezing process systematically excluded the zinc as only 1/5 of the original zinc was retained in the portion that had been frozen and that zinc was found in the water fraction that had not been frozen. Geochemical sampling of water in the winter would logically be limited to the water fraction.

We also found that the minimum analytical limit for zinc was about 0.1 ppm. However, I have learned of a simple procedure for liquid - liquid extraction of zinc by chelating with ammonium pyrrolidine dithiocarbamate and extraction into methyl iso-butyl ketone. The procedure is apparently rapid, simple and sure. I think that the analytical minimum for zinc could be easily lowered to about 0.01 ppm (10 ppb) with this method. A 500 ml water sample could be extracted into 10 ml of MIBK providing a concentration factor of $\frac{500}{10} = 50$, or an analytical limit of $\frac{0.1}{50} = 0.002 = 2$ ppb.