METHOD #: 289.2	Approved for NPDES (Issued 1978)
TITLE:	Zinc (AA, Furnace Technique)
ANALYTE:	CAS # Zn Zinc 7440-66-6
INSTRUMENTATION:	AA
STORET No.	Total 01092 Dissolved 01090 Suspended 01091
Optimum Concentration Range: **Detection Limit:**	0.2 - 4 μg/L 0.05 μg/L

1.0 Preparation of Standard Solution

1.1 Stock Solution: Prepare as described under "direct aspiration method".
1.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. These solutions are also to be used for "standard additions".
1.3 The calibration standard should be diluted to contain 0.5% (v/v) HNO_3.

2.0 Sample Preservation

2.1 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.

3.0 Sample Preparation

3.1 Prepare as described under "direct aspiration method". Sample solution for analysis should contain 0.5% (v/v) HNO_3.

4.0 Instrument Parameters (General)

4.1 Drying Time and Temp: 30 sec - 125°C.
4.2 Ashing Time and Temp: 30 sec - 400°C.
4.3 Atomizing Time and Temp: 10 sec - 2500°C.
4.4 Purge Gas Atmosphere: Argon.
4.5 Wavelength: 213.9 nm.
4.6 Other operating parameters should be set as specified by the particular instrument manufacturer.

5.0 Analysis Procedure

5.1 For the analysis procedure and the calculation, see "Furnace Procedure" part 9.3 of the Atomic Absorption Methods section of this manual.

6.0 Notes

6.1 The above concentration values and instrument conditions are for a Perkin-Elmer HGA-2100, based on the use of a 20 μL injection, continuous flow purge gas and non-pyrolytic graphite. Smaller size furnace devices or those employing faster rates of atomization can be operated using lower atomization temperatures for shorter time periods than the above recommended settings.

6.2 The use of background correction is recommended.

6.3 Nitrogen may also be used as the purge gas.

6.4 The analysis of zinc by the graphite furnace is extremely sensitive and very subject to contamination from the work area, reagents, and pipet tips. Since all these factors affect the precision and accuracy, zinc should be analyzed by the direct aspiration procedure whenever possible.

6.5. For every sample matrix analyzed, verification is necessary to determine that method of standard addition is not required (see part 5.2.1 of the Atomic Absorption Methods section of this manual).

6.6 If method of standard addition is required, follow the procedure given earlier in part 8.5 of the Atomic Absorption Methods section of this manual.

6.7 Data to be entered into STORET must be reported as μg/L.

7.0 Precision and Accuracy

7.1 Precision and accuracy data are not available at this time.

Method 289.2

For Zinc, Method 289.2 (Atomic Absorption, Furnace Technique) replace the Precision and Accuracy Section statement with the following:

Precision and Accuracy

An interlaboratory study on metal analyses by this method was conducted by the Quality Assurance Branch (QAB) of the Environmental Monitoring Systems Laboratory-Cincinnati (EMSL-CI). Synthetic concentrates containing various levels of this element were added to reagent water, surface water, drinking water and three effluents. These samples were digested by the total digestion procedure, 4.1.3 in this manual. Results for the reagent water are given below. Results for other water types and study details are found in "EPA Method Study 31, Trace Metals by Atomic Absorption (Furnace Techniques)," National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, Order No. PB 86-121 704/AS, by Copeland, F.R. and Maney, J.P., January 1986.

For a concentration range of 0.51-189 μg/L.
X=1.6710(C)+1.485
S=0.6740(X)-0.342
SR=0.3895(X)-0.384

Where:
C=True Value for the Concentration, μg/L
X=Mean Recovery, μg/L
S=Multi-laboratory Standard Deviation, μg/L
SR=Single-analyst Standard Deviation, μg/L

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