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|---|---|
| **METHOD #: 289.1** | Approved for NPDES (Editorial Revision 1974) |
| **TITLE:** | Zinc (AA, Direct Aspiration) |
| **ANALYTE:** | CAS # Zn Zinc 7440-66-6 |
| **INSTRUMENTATION:** | AA |
| **STORET No.** | Total 01092<br>Dissolved 01090<br>Suspended 01091 |
| **Optimum Concentration Range:**<br>**Sensitivity:** | 0.05-1 mg/L using a wavelength of 213.9 nm<br>0.02 mg/L |
| **Detection Limit:** | 0.005 mg/L |

1.0 Preparation of Standard Solution

1.1 Stock Solution: Carefully weigh 1.00 g of zinc metal (analytical reagent grade) and dissolve cautiously in 10 mL $HNO_3$. When solution is complete make up to 1 liter with deionized distilled water. 1 mL = 1 mg Zn (1000 mg/L).

1.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed either directly or after processing.

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 The procedures for preparation of the sample as given in parts 4.1.1 thru 4.1.4 of the Atomic Absorption Methods section of this manual have been found to be satisfactory.

4.0 Instrumental Parameters

4.1 Zinc hollow cathode lamp
4.2 Wavelength: 213.9 nm
4.3 Fuel: Acetylene
4.4 Oxidant: Air
4.5 Type of flame: Oxidizing

5.0 Analysis Procedure

5.1 For the analysis procedure and the calculation, see "direct aspiration" part 9.1

of the Atomic Absorption Methods section of this manual.

6.0 Notes

6.1 High levels of silicon may interfere
6.2 The air-acetylene flame absorbs about 25% of the energy at the 213.9 nm line.
6.3 The sensitivity may be increased by the use of low-temperature flames.
6.4 Some sample container cap liners can be a source of zinc contamination. To circumvent or avoid this problem, the use of polypropylene caps is recommended.
6.5 The dithizone colorimetric method may also be used (Standard Methods, 14th Edition, p 265).
6.6 For concentrations of zinc below 0.01 mg/L, either the Special Extraction Procedure given in part 9.2 of the Atomic Absorption Methods section or the furnace procedure, Method 289.2, is recommended.
6.7 Data to entered into Storet must be reported as $\mu$g/L.

7.0 Precision and Accuracy

7.1 An interlaboratory study on trace metal analyses by atomic absorption was conducted by the Quality Assurance and Laboratory Evaluation Branch of EMSL. Six synthetic concentrates containing varying levels of aluminum, cadmium, chromium, copper, iron, manganese, lead and zinc were added to natural water samples. The statistical results for zinc were as follows:

| Number of Labs | True Values $\mu$g/Liter | Standard Mean Value $\mu$g/Liter | Deviation $\mu$g/Liter | Accuracy as % Bias |
|---|---|---|---|---|
| 86 | 281 | 284 | 97 | 1.2 |
| 89 | 310 | 308 | 114 | -0.7 |
| 82 | 56 | 62 | 28 | 11.3 |
| 81 | 70 | 75 | 28 | 6.6 |
| 62 | 7 | 22 | 26 | 206 |
| 61 | 11 | 17 | 18 | 56.6 |