

SELENIUM

Method 270.3 (Atomic Absorption, gaseous hydride)

STORET NO. Total 01147

Dissolved 01145

Suspended 01146

1. Scope and Application
 - 1.1 The gaseous hydride method determines inorganic selenium when present in concentrations at or above 2 ug/1. The method is applicable to drinking water and most fresh and saline waters, in the absence of high concentrations of chromium, cobalt, copper, mercury, molybdenum, nickel and silver.
2. Summary of Method
 - 2.1 Selenium in the sample is reduced from the +6 oxidation state to the +4 oxidation state by the addition of SnCl₂. Zinc is added to the acidified sample, producing hydrogen and converting the selenium to the hydride, SeH₂. The gaseous selenium hydride is swept into an argon-hydrogen flame of an atomic absorption spectrophotometer. The working range of the method is 2–20 ug/1 using the 196.0 nm wavelength.
3. Comments
 - 3.1 In analyzing drinking water and most surface and ground waters, interferences are rarely encountered. Industrial waste samples should be spiked with a known amount of selenium to establish adequate recovery.
 - 3.2 Organic forms of selenium must be converted to an inorganic form and organic matter must be oxidized before beginning the analysis. The oxidation procedure given in method 206.5 (Standard Methods, 14th Ed. 404B, p 285, Procedure 4.1) should be used.
 - 3.3 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.
 - 3.4 For quality control requirements and optional recommendations for use in drinking water analyses, see part 10 of the Atomic Absorption Methods section of this manual.
 - 3.5 Data to be entered into STORET must be reported as ug/1.
4. Precision and Accuracy
 - 4.1 Ten replicate solutions of selenium oxide at the 5, 10 and 15 ug/1 level were analyzed by a single laboratory. Standard deviations at these levels were ±0.6, ±1.1 and ±2.9 with recoveries of 100, 100 and 101%. (Caldwell, J. S., Lishka, R. J., and McFarren, E. F., "Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram per Liter Levels", JAWWA, vol 65, p. 731, Nov. 1973.)

Approved for NPDES and SDWA
Issued 1974

5. References

- 5.1 Except for the perchloric acid step, the procedure to be used for this determination is found in:
Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 159,
Method 301A(VII), (1975)