



Trace Mercury Analysis by Cold Vapor Atomic Fluorescence

Nippon Instruments (NIC) Model RA-4300FG+ Mercury Analyzer

At a Glance:

- Mercury in Wastewater
- Trace Mercury Analysis
- EPA Method 1631E
- Atomic Fluorescence
- Direct Purge Technique
- NPDES Permits

Mercury Results:

Sample	Hg (ng/L)	Avg/SD
Waste-1 (Mon)	1.58	Avg: 1.69ppt StDev: 0.08ppt
Waste-1 (Wed)	1.77	
Waste-1 (Fri)	1.71	
Waste-2 (Mon)	1.45	Avg: 1.41ppt StDev: 0.03ppt
Waste-2 (Wed)	1.37	
Waste-2 (Fri)	1.42	
Matrix Spk (5ppt)	4.898 (98%)	2.5% RSD

Overview

Mercury that is discharged to freshwater and marine water sources is being monitored at lower levels than ever before. The US EPA National Pollutant Discharge Elimination System (NPDES) permits are often being issued with 12ppt and 24ppt reporting limits for mercury, respectively. The need for accurate and precise mercury analysis is crucial at these trace mercury levels.

Instrumentation

Trace mercury analysis of industrial and municipal wastewaters is simplified and easily accomplished using the Model RA-4300FG+ Mercury Analyzer. The samples may be loaded into the autosampler either before or

after oxidant quenching, registered in the software, and the RA-4300FG+ can quench and analyze up to 80 standards and samples per sample tray, completely unattended.



- 3) Stannous chloride is then injected into the sample tube.
- 4) The mercury is directly purged from the sample tube and collected onto a gold trap for EPA 1631. For EPA 245.7, the gold trap is bypassed.
- 5) The mercury is desorbed from the gold trap and measured by an atomic fluorescence detector.

Calibration

The RA-4300FG+ is easily calibrated using aqueous mercury standards. Per EPA protocols for these methods, calibration is typically performed with each batch of samples, but recalibration is only required if over 12 hours has passed since performance verification.

Procedure

- 1) Load 5-mL of sample into each sample tube.
- 2) For unquenched samples, the RA-4300FG+ will first quench and purge free chlorine.

Results & Discussion

Two wastewater samples with known mercury levels between 1ppt and 2ppt along with accompanying QC samples were tested on the RA-4300FG+ by EPA 1631E. The measurements were made on Monday, Wednesday, and Friday of the same week to illustrate accuracy and precision.

For verification of accuracy, a matrix spike of 5ppt was measured in each

wastewater sample.

The RA-4300FG+ proved to be accurate and precise at trace levels for mercury analysis. Final results included 98% recoveries on matrix spikes and consistent trace mercury results for real-world wastewater samples over multiple days of testing. All QC samples passed during analysis.

RA-4300FG+ Key Details

- Direct Purge Technology
- Built-in Filtration System
- <0.1ppt Hg MDL
- Auto Oxidant Quenching
- EPA 1631 QC Parameters Included in Software
- EPA 245.7 & EPA 1631E



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In 2003, we introduced the revolutionary mercury analyzers manufactured by Nippon Instruments Corporation (NIC). We now offer multiple sample preparation solutions for metals analysis, in addition to the NIC mercury analyzers. Our PreeKem Microwave Systems and AGS Scientific Block Digestion Systems offer many user-focused advantages to reduce both time and costs associated with sample preparation. You can trust AGS Scientific to continue to bring you high quality products and reliable customer service.

Contact us for more information on our Mercury Analyzers, Microwave Digestion Systems, and Block Digestion Systems.

AGS Scientific, Inc. Offers a Variety of Solutions for Mercury and Other Metals Analysis



Hg by EPA 1631 / 245.7



DURABlock AUTO Digestion



Microwave Digestion



Hg by EPA 245.1



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