Measure Mercury at Picogram Levels

Since 1996, Columbia Analytical Services, Inc. has performed EPA Method 1631 (technically, total recoverable mercury) in the range of 1 to 200 ng/L (parts per trillion). The procedure measures all forms of mercury, including: Hgo, Hg2+, strongly organo-complexed Hg2+ compounds, adsorbed particulate Hg, and several covalently bonded organomercurials.

The EPA has begun moving ahead with mercury regulations and many states have issued fish advisories for water bodies in their jurisdictions. The lowest nationwide mercury water quality criterion is 12 ng/L and the lowest local water quality criterion is the Great Lakes standard of 1.3 ng/L. Measurements at these levels are made possible by EPA Method 1631. This method measures mercury thermally desorbed from a gold trap in a cold vapor atomic fluorescence spectrometer (CVAFS). An aqueous sample is oxidized with bromine monochloride and sparged with nitrogen onto the gold trap. The analytical technique is linear from 0.5 ng/L to 200 ng/L with a minimum detection limit of 0.2 ng/L.

Sampling

It is very easy to contaminate the samples so care must be taken during this critical step. The clean sampling techniques of EPA Method 1669 should be used. Check to make sure you have avoided all sources of potential contamination including improperly cleaned equipment, atmospheric input and human contact. Most mercury in surface water comes from atmospheric deposition. Rain washes mercury from the air, so don't sample when it is raining or prevent rainwater from falling into the sample bottle. If you have amalgam fillings, even breathing into the sample bottle may cause contamination. Following these clean sampling procedures has resulted in the accepted levels of mercury in the ocean falling from many tens of nanograms per liter to about 1 ng/L.

Sample Types

- Sea Water
- Pore Water
- Fresh Water
- Industrial Effluents
- Waste Water
- Drinking Water

Quality Assurance

Since the level of mercury in matrix spikes should be at the compliance level or 1 to 5 times the background level, it is helpful to know the compliance level or the approximate amount of mercury expected in the samples. Besides matrix spikes, the method calls for measuring standards at 5 ng/L from two sources and running many different blanks to assess contamination either in the field or in the laboratory.

Laboratory Selection Criteria

Selection should be based on the experience of the laboratory, the knowledge and skill of laboratory personnel, the quality assurance/quality control, and the documented history of performance of the laboratory. For determination of mercury using Method 1631, particularly for making measurements at or near 1 ng/L, a documented history of freedom from contamination and recovery of OPRs and MS/MSDs within the QC acceptance criteria of Method 1631 provide an indication that the analyses are being performed reliably.

Columbia Analytical Services™