

Field-deployable Calibrator for Gas Phase Elemental and Oxidized Mercury Compounds

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Abstract

This patented technology provides an improved system for detecting and speciating gaseous mercury in air, using a dual-channel approach. The first channel measures total mercury, and the other measures elemental mercury after removing oxidized forms. These two measurements allow for a subtractive approach to calculate exact speciation.

The technology also includes calibration systems for mercury in air that are traceable to SI standards.

What It Is

A patented, field-ready dual-channel gaseous mercury detector with an integrated calibration module that measures total and elemental mercury and derives oxidized-mercury concentrations.

Value Proposition

Provides accurate mercury speciation with real-time self-calibration, corrects underreporting of oxidized mercury, and is cost-competitive versus many existing systems.

Applicable Markets

Environmental testing and compliance labs, air-quality monitoring agencies, mining and heavy industry sites, and instrumentation manufacturers needing reliable mercury speciation.

Benefit

Existing mercury monitoring systems can underreport oxidized mercury, especially in high-ozone environments, because some denuder-based capture methods lose collected oxidized species. This leads to biased datasets and serious underreporting. Additionally, speciation is becoming globally required for environmental reporting, so sensors that record only elemental mercury won't suffice to meet regulatory requirements.

This technology uses a dual-channel approach: one channel superheats incoming air to measure total mercury, while the second channel removes oxidized species and measures elemental mercury. Subtractive speciation yields oxidized mercury concentrations. An integrated calibration module injects a known quantity of mercury at levels relevant to the ambient atmosphere for real-time self-calibration, preserving accuracy and removing systematic bias due to environmental effects. Calibrations are traceable to SI gravimetric standards.

With reliable, species-resolved mercury data and built-in calibration, the system helps compliance testers and monitoring agencies reduce regulatory risk and offers a cost-competitive alternative to legacy instruments. Improved accuracy in oxidized-mercury reporting allows instrumentation manufacturers and global monitoring companies to improve data quality.

Market Application

This system offers high-accuracy mercury speciation with real-time calibration, making it an attractive licensing opportunity for instrumentation manufacturers or environmental testing firms.

Researchers

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Intellectual Property

U.S. Patent No. 10,012,622 issued July 3, 2018, and U.S. Patent No. 10,545,123 issued January 28, 2020.