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Information Brief

An Overview of International Methods and Regulations for Airborne Metal Particulate

In today's work-safety landscape, air quality concerns have become a constant in multiple industries and business sectors. For worker safety and employer compliance, multiple standardization and regulatory bodies have put forth methods for air monitoring, including those for airborne metal particles. In the interest of demystifying the wide variety of voluntary consensus standards and directives, this is a cursory overview of the major regulations of concern.

EN/CEN 13890:2009 – Workplace exposure. Procedures for measuring metals and metalloids in airborne particles. Requirements and test methods

Updated in 2009, this method specifies performance requirements and testing protocols for the evaluation of the efficacy and validity of procedures for measuring metal and metalloids in airborne particles sampled onto a substrate (quartz or mixed cellulose fiber filters). This method has been implemented in the national testing standards of 31 European countries, including all members of the EU, Nordic states and the UK. Adapted as part of internal QA, all industrial hygiene testing methods must comply to the rigors of this method's requirement. Part of the method's specifications includes the requirement for a measurement of analytical recovery, determined by analysis of spiked laboratory blanks. SPEX CertiPrep filters are an ideal candidate for use with this method and all SOPs validated by it.

ISO 15202:2012 (Parts 1, 2 and 3) – Workplace air – Determination of metals and metalloids in airborne particulate matter by ICP-AES

Written and implemented by the esteemed International Organization for Standardization (ISO), this method provides a detailed SOP on the analysis of metallic particles in ambient air; Parts 1, 2 and 3 of ISO 15202:2012 establish guidelines for sampling, sample preparation and analysis, respectively. The method is generally accepted as the preferred testing instructions for all industrial sites conforming to other ISO certifications and requirements. Of particular interest is the following phrase from the method's scope: "… inadequate matrix-matching can adversely affect results". Beyond the importance of spiked filters in verifying recover rates, the creators of this method thoroughly understand the importance of comparing like-to-like and recommend the use of properly matched, spiked filter media as matrix-matched standards.

ASTM D7035 – 16 Standard Test Method for Determination of Metals and Metalloids in Airborne Particulate Matter by ICP-AES

Similar to the ISO 15202:2012 methodology, and popular with heavy-industry air monitoring efforts, ASTM D7035 outlines the procedures for sample collection, preparation, testing and analysis for airborne metal particulate. Like ISO 15202:2012, the methodology also recommends the use of matrix matched standards, where possible (as well as the use of matrix-matched spiked filters for recovery calculation).

NIOSH 7300 Method series (7300, 7301, 7302, 7303) – Elements by ICP

Developed by the National Institute for Occupational Safety and Health (a division of the CDC), this quartet of methods mirrors all of its international counterparts in scope and instruction. However, while all of the previous methods do not specify a filter type, the NIOSH series does stipulate the use of mixed cellulose ester membranes. The major difference between the four 7300-series methods is the method of sample preparation (Nitric/Perchloric Acid ashing, Aqua Regia ashing, microwave digestion and hot block acid digestion respectively). As with all of the preceding methods, the "Calibration and Quality Control" section of the instructions specifically mentions using spiked, matrixmatched filters for recovery verification and calibration. Unlike the previously cited regulations, the full literature for these methods can be downloaded, for free, from the CDC website.

IO-3 – Chemical Species Analysis of Filter-Collected Suspended Particulate Matter

Published by the US EPA, the IO-3 is a section of the larger "Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air". While all of the previously discussed methods are specifically designed around ICP-AES (with some allowances for ICP-MS and AA analysis), Section 3 of this compendium provides firm guidelines on various testing methods including ICP, ICP-MS, AA and XRF. Like all of the above methods, there is a requirement for matrix-matched standards and spiked filters to calculate and verify recovery. Similar to the NIOSH methods, the individual sub sections of IO-3 (each dealing with a different analysis method) are available for free download from the EPA's website.

spex.com

Phone: +1.732.549.7144 • +1.800.LAB.SPEX
Fax: +1.732.603.9647
spexsales@antylia.com

Connect with us