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Standard Test Method for LEAD (INORGANIC) IN WORKPLACE ATMOSPHERES BY ATOMIC ABSORPTION SPECTROMETRY¹

This standard is issued under the fixed designation D 3413; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This method has been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 This method covers the determination by atomic absorption spectrophotometry of low concentrations of lead (Pb) in air samples collected on filters, electrostatic precipitator tubes, or impingers.

1.2 With a properly operating atomic absorption spectrophotometer, concentrations as low as 0.2 μg of lead per millilitre (microgram per millilitre) of solution may be determined.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. (For more specific safety precautionary information see Section 9.)*

2. Applicable Documents

2.1 ASTM Standards:

- D 1193 Specification for Reagent Water²
- D 1356 Definitions of Terms Relating to Atmospheric Sampling and Analysis³
- D 1357 Practice for Planning the Sampling of the Ambient Atmosphere³
- D 4185 Test Methods for Metals in Workplace Atmosphere by Atomic Absorption Spectrophotometry³

2.2 American National Standards:

- Z37.11 Acceptable Concentrations of Toxic Dusts and Gases: Lead and Its Inorganic Compounds

3. Summary of Method

3.1 The filter (cellulose ester membrane) is ashed with nitric acid, the ash is dissolved in dilute nitric and diluted to a known volume.

3.2 The sample is washed from the electrostatic precipitator with dilute nitric acid using a rubber policeman for quantitative transfer. The sample is diluted to a known volume.

3.3 The impinger sample is quantitatively transferred to a volumetric flask and diluted to a known volume.

3.4 The sample, diluted to a known volume, is aspirated into an air-acetylene flame of the atomic absorption spectrophotometer and the absorbance at the 283.3-nm line of lead is measured.

4. Significance and Use

4.1 The current permissible exposure limit (PEL) is fifty micrograms of lead per cubic metre of air ($50 \mu\text{g}/\text{m}^3$) averaged over an 8-h period. The action level is thirty micrograms of lead per cubic metre ($30 \mu\text{g}/\text{m}^3$) averaged over an 8-h period.⁴

4.2 This method is recommended because it is capable of measuring the concentration of lead

¹ This method is under the jurisdiction of ASTM Committee D-22 on Sampling and Analysis of Atmospheres, and is the direct responsibility of Subcommittee D22.04 on Analysis of Work Space Atmospheres.

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² Annual Book of ASTM Standards, Vols 11.01 and 11.03.

³ Annual Book of ASTM Standards, Vol 11.03.

⁴ Federal Register, 29 CFR 1910.1025.