



Designation: D8243 – 19

Standard Test Method for Determination of APS Reductase to Estimate Sulfate Reducing Bacterial Bioburdens in Water – Enzyme-Linked Immunosorbent Assay Method¹

This standard is issued under the fixed designation D8243; 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.

1. Scope

1.1 This test method provides a protocol for using enzyme-linked immunosorbent assay (ELISA) technology to test water samples for the enzyme adenosine 5'-phosphosulfate reductase (APSr) concentration.

1.1.1 APSr is present in all known sulfate reducing protists (SRP – sulfate reducing bacteria – SRB – and sulfate reducing archaea – SRA).

1.1.2 As reported in U.S. Patent 4,999,286, APS reductase concentration can be used as a surrogate parameter for estimating SRA bioburdens (Appendix X1 compares results from Test Methods D8243, D4412, and quantitative polymerase chain reaction – qPCR – testing).

1.2 This test method has been validated in tap water, oilfield produced water (salinities ranging from 100 g L⁻¹ to 600 g L⁻¹), and fuel-associated water (commonly referred to as bottoms-water).

1.3 This test method detects APS reductase semi-quantitatively in the range of 0.001M to 0.1M – correlating to 10² SRP/mL to 10⁶ SRP/mL.

1.3.1 As described in Appendix X2 test method sensitivity can be increased 10-fold to 100-fold. However, the precision statistics provided in X apply only to 10-mL specimens.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Some specific hazards statements are given in Section 9 on Hazards.

1.6 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D1129 Terminology Relating to Water
- D4412 Test Methods for Sulfate-Reducing Bacteria in Water and Water-Formed Deposits
- D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis
- D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants
- D6499 Test Method for Immunological Measurement of Antigenic Protein in Hevea Natural Rubber (HNR) and its Products
- D7464 Practice for Manual Sampling of Liquid Fuels, Associated Materials and Fuel System Components for Microbiological Testing
- E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
- E1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method
- E1847 Practice for Statistical Analysis of Toxicity Tests Conducted Under ASTM Guidelines
- E1914 Practice for Use of Terms Relating to the Development and Evaluation of Methods for Chemical Analysis (Withdrawn 2016)³

2.2 Patents:⁴

- U.S. Patent 4,999,286 Sulfate Reducing Bacteria Determination and Control, March 12, 1991

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.24 on Water Microbiology.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from United States Patent and Trademark Office (USPTO), Madison Building, 600 Dulany Street, Alexandria, VA 22314, <https://www.uspto.gov>.