



Standard Test Method for Measurement of On-line Integrated Samples of Low Level Suspended Solids and Ionic Solids in Process Water by X-Ray Fluorescence (XRF)¹

This standard is issued under the fixed designation D6502; 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 covers the operation, calibration, and data interpretation for an on-line corrosion product (metals) monitoring system. The monitoring system is based on x-ray fluorescence (XRF) analysis of metals contained on membrane filters (for suspended solids) or resin membranes (for ionic solids). Since the XRF detector is sensitive to a range of emission energy, this test method is applicable to simultaneous monitoring of the concentration levels of several metals including titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, mercury, lead, and others in a flowing sample. A detection limit below 1 ppb can be achieved for most metals.

1.2 This test method includes a description of the equipment comprising the on-line metals monitoring system, as well as, operational procedures and system specifications.

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

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D1066 Practice for Sampling Steam

D1129 Terminology Relating to Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D3370 Practices for Sampling Water from Closed Conduits

D3864 Guide for On-Line Monitoring Systems for Water Analysis

D4453 Practice for Handling of High Purity Water Samples

D5540 Practice for Flow Control and Temperature Control for On-Line Water Sampling and Analysis

D6301 Practice for Collection of On-Line Composite Samples of Suspended Solids and Ionic Solids in Process Water

3. Terminology

3.1 Definitions:

3.1.1 For definitions of other terms used in this standard, refer to Terminology D1129 and Guide D3864.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *emission intensity, n*—the measure of the amplitude of fluorescence emitted by a sample element.

3.2.1.1 *Discussion*—This measurement is correlated with a calibration curve for quantitative analysis. The emission intensity generally is given in units of counts per second (c/s).

3.2.2 *excitation source, n*—the component of the XRF spectrometer, providing the high-energy radiation used to excite the elemental constituents of a sample, leading to the subsequent measured fluorescence.

3.2.2.1 *Discussion*—The excitation source may be an electronic x-ray generating tube or one of a variety of radioisotopes emitting an x-ray line of a suitable energy for the analysis at hand.

3.2.3 *integrated sample, n*—the type of sample collected by concentrating the metal constituents of a water sample using a filter or an ion-exchange resin.

3.2.3.1 *Discussion*—These samples typically are collected over long time periods (up to several days). The result of analysis of the collection medium yields a single measurement, which, when divided by the total sample volume, is interpreted as the average metals concentration during the time of collection.

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.03 on Sampling Water and Water-Formed Deposits, Analysis of Water for Power Generation and Process Use, On-Line Water Analysis, and Surveillance of Water.

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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.