



Standard Test Method for Water Using Volumetric Karl Fischer Titration¹

This standard is issued under the fixed designation E203; 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 standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method is intended as a general guide for the application of the volumetric Karl Fischer (KF) titration for determining free water and water of hydration in most solid or liquid organic and inorganic compounds. This test method is designed for use with automatic titration systems capable of determining the KF titration end point potentiometrically; however, a manual titration method for determining the end point visually is included as [Appendix X1](#). Samples that are gaseous at room temperature are not covered (see [Appendix X4](#)). This test method covers the use of both pyridine and pyridine-free KF reagents for determining water by the volumetric titration. Determination of water using KF coulometric titration is not discussed. By proper choice of the sample size, KF reagent concentration and apparatus, this test method is suitable for measurement of water over a wide concentration range, that is, parts per million to pure water.

1.2 The values stated in SI units are to be regarded as standard.

1.3 *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.* Specific warnings are given in [3.1](#) and [7.3.3](#).

1.4 Review the current Safety Data Sheets (SDS) for detailed information concerning toxicity, first aid procedures, and safety precautions for chemicals used in this test procedure.

2. Referenced Documents

2.1 A list of existing ASTM Karl Fischer methods, their applications to various products, and the sponsoring committees is given in [Appendix X3](#).

2.2 ASTM Standards:²

- [D789 Test Methods for Determination of Solution Viscosities of Polyamide \(PA\)](#)
- [D803 Test Methods for Testing Tall Oil](#)
- [D890 Test Method for Water in Liquid Pine Chemicals](#)
- [D1123 Test Methods for Water in Engine Coolant Concentrate by the Karl Fischer Reagent Method](#)
- [D1152 Specification for Methanol \(Methyl Alcohol\)](#)
- [D1193 Specification for Reagent Water](#)
- [D1348 Test Methods for Moisture in Cellulose](#)
- [D1364 Test Method for Water in Volatile Solvents \(Karl Fischer Reagent Titration Method\)](#)
- [D1533 Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration](#)
- [D1568 Test Methods for Sampling and Chemical Analysis of Alkylbenzene Sulfonates](#)
- [D1631 Test Method for Water in Phenol and Related Materials by the Iodine Reagent Method](#)
- [D2072 Test Method for Water in Fatty Nitrogen Compounds \(Withdrawn 2007\)³](#)
- [D2575 Methods of Testing Polymerized Fatty Acids \(Withdrawn 2007\)³](#)
- [D3277 Test Methods for Moisture Content of Oil-Impregnated Cellulosic Insulation \(Withdrawn 2010\)³](#)
- [D3401 Test Methods for Water in Halogenated Organic Solvents and Their Admixtures](#)
- [D4017 Test Method for Water in Paints and Paint Materials by Karl Fischer Method](#)
- [D4377 Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration](#)
- [D4672 Test Method for Polyurethane Raw Materials: Determination of Water Content of Polyols](#)
- [D4928 Test Method for Water in Crude Oils by Coulometric Karl Fischer Titration](#)
- [D5460 Test Method for Rubber Compounding Materials—Water in Rubber Additives](#)

¹ This test method is under the jurisdiction of ASTM Committee [D16](#) on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee [D16.15](#) on Industrial and Specialty General Standards.

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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.