Designation: D4377 – 00 (Reapproved 2006)

Designation: Manual of Petroleum Measurement Standards (MPMS), Chapter 10.7

Designation: 356/99

Standard Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration[1]

This standard is issued under the fixed designation D4377; 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 Department of Defense.

1. Scope

1.1 This test method covers the determination of water in the range from 0.02 to 2 % in crude oils. Mercaptan and sulfide (S^- or H_2S) sulfur are known to interfere with this test method (see Section 5).

1.2 This test method is intended for use with standard Karl Fischer reagent or pyridine-free Karl Fischer reagents.

1.3 The values stated in SI units are to be regarded as the 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.* Specific precautionary statements are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1193 Specification for Reagent Water

D4006 Test Method for Water in Crude Oil by Distillation

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

E203 Test Method for Water Using Volumetric Karl Fischer Titration

2.2 *API Standards:*[3]

MPMS Chapter 8.1 Manual Sampling of Petroleum and Petroleum Products (ASTM Practice D4057)

MPMS Chapter 8.2 Automatic Sampling of Petroleum and Petroleum Products (ASTM Practice D4177)

MPMS Chapter 10.2 Determination of Water in Crude Oil by Distillation (ASTM Test Method D4006)

3. Summary of Test Method

3.1 After homogenizing the crude oil with a mixer, an aliquot of the crude, in a mixed solvent, is titrated to an electrometric end-point using Karl Fischer reagent.

4. Significance and Use

4.1 A knowledge of the water content of crude oil is important in the refining, purchase, sale, or transfer of crude oils.

5. Interferences

5.1 A number of substances and class of compounds associated with condensation or oxidation-reduction reactions interfere in the determination of water by Karl Fischer. In crude oils, the most common interferences are mercaptans and sulfides. At levels of less than 500 µg/g (ppm) (as sulfur) the interference from these compounds is insignificant. For more information on substances that interfere in the determination of water using the (Karl Fischer reagent) titration method see Test Method E203.

6. Apparatus

6.1 *Karl Fischer Apparatus*, using electrometric end-point. A suggested assembly of the apparatus is described in Annex A2.

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and the API Committee on Petroleum Measurement, and is the direct responsibility of Subcommittee D02.02.0B /COMQ, the joint ASTM-API Committee on Sampling, Sediment, Water.

Current edition approved Nov. 1, 2006. Published December 2006. Originally approved in 1984. Last previous edition approved in 2000 as D4377 – 00 ε1. DOI: 10.1520/D4377-00R06.

[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] Published as Manual of Petroleum Measurement Standards. Available from American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005-4070, http://api-ec.api.org.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.