Manual of Petroleum Measurement Standards
Chapter 10—Sediment and Water

Section 4—Determination of Water and/or Sediment in Crude Oil by the Centrifuge Method (Field Procedure)

THIRD EDITION, DECEMBER 1999

REAFFIRMED, SEPTEMBER 2010

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FOREWORD

The American Petroleum Institute, the (British) Institute of Petroleum (IP), and corresponding bodies of other nations have worked through Technical Committee 28 of the International Organization for Standardization (ISO) to produce several international standards that relate directly to the *API Manual of Petroleum Measurement Standards.*

Section 4 of Chapter 10 discusses the field centrifuge test method for determining water and/or sediment in crude oil. Section 4 is primarily intended for use within the United States and has not been approved by IP or ISO. This edition of Section 4 of Chapter 10 supersedes all previous editions of this standard.

Section 1 of Chapter 10 describes the determination of sediment in crude oils and fuel oils by the extraction method. Section 2 discusses the determination of water in crude oil by the distillation method. Section 3 describes the determination of sediment and water by a laboratory centrifuge procedure.

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Suggested revisions are invited and should be submitted to Measurement Coordination, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

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Chapter 10—Sediment and Water

SECTION 4—DETERMINATION OF WATER AND/OR SEDIMENT IN CRUDE OIL BY THE CENTRIFUGE METHOD (FIELD PROCEDURE)

10.4.1 Scope and Field of Application

10.4.1.1 This section describes the field centrifuge method for determining both water and sediment or sediment only in crude oil. This method may not always produce the most accurate results, but it is considered the most practical method for field determination of water and/or sediment. When a higher degree of accuracy is required, the laboratory procedure described in Chapter 10.2, "Determination of Water in Crude Oil by Distillation" (ASTM D 4006), or Chapter 10.9, "Standard Test Method for Water in Crude Oils by Coulometric Karl Fischer" (ASTM D 4928), and the procedure described in Chapter 10.1, "Determination of Sediment in Crude Oils and Fuel Oils by the Extraction Method" (ASTM D 473) or Chapter 10.8, "Standard Test Method for Sediment in Crude Oil by Membrane Filtration" (ASTM D 4807) should be used.

Note: Water by Distillation, and Sediment by Extraction, are considered the referee methods for determining water and sediment in crude oils.

10.4.1.2 The requirements of 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. The user of this standard has the responsibility for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

10.4.2 References

API

Manual of Petroleum Measurement Standards

Chapter 8, "Sampling Petroleum and Petroleum Products"

Chapter 10, "Sediment and Water"

ACGIH[1]

Threshold Limit Values and Biological Exposure Indices for 1987 – 1988

ASTM[2]

D 473 *Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method*

D 3699 *Specification for Kerosine*

D 4006 *Test Method for Water in Crude Oil by Distillation*

D 4057 *Practice for Manual Sampling of Petroleum and Petroleum Products*

D 4177 *Method for Automatic Sampling of Petroleum and Petroleum Products*

D 4928 *Standard Test Method for Water in Crude Oils By Coulometric Karl Fischer Titration (Karl Fischer) Titration*

E 542 *Practice for Calibration of Volumetric Ware*

OSHA[3]

29 *CFR* Subpart G, "Toxic and Hazardous Substances," Section 1910.1000

10.4.3 Definitions

10.4.3.1 sediment: A material that normally exists in crude oil as extremely fine, well dispersed solids that originate in the reservoir from which the crude came, or in drilling fluids used to drill the wells, which may take the form of sand, clay, shale, or rock particles. Other sediments such as scale can be picked up from tubing, pipe, tanks, and other production and transportation equipment. Sediment, as defined in this standard, must have a density greater than water and will not float at test conditions.

10.4.3.2 demulsifier-stock solution: A mixture of demulsifier and solvent in a fixed ratio (e.g. 25% – 75%) which is added to the test solvent to form a solution to cause a clear and distinct separation between the oil and water interface.

10.4.3.3 solvent-solution: A mixture of any one of the approved solvents and a demulsifier, or a demulsifier-stock solution which is used as a diluent to help the separation of water and sediment from the sample being tested.

10.4.3.4 solvent: Any one of the approved liquids capable of dissolving or dispersing the water and sediment in the sample being tested.

10.4.4 Significance and Use

A determination of water and/or sediment content is required to accurately determine the net volumes of crude oil

[1]American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Cincinnati, Ohio 45240.

[2]American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959.

[3]Occupational Safety and Health Administration, U.S. Department of Labor. *The Code of Federal Regulations* is available from the Government Printing Office, Washington, D.C. 20402.