



Standard Test Method for Salts in Crude Oil (Electrometric Method)¹

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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 the approximate chloride (salts) concentration in crude oil. The range of concentration covered is 0 to 500 mg/kg or 0 to 150 lb/1000 bbl as chloride concentration/volume of crude oil.

1.2 This test method measures conductivity in the crude oil due to the presence of common chlorides, such as sodium, calcium, and magnesium. Other conductive materials may also be present in the crude oil.

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

1.3.1 *Exception*—Acceptable concentration units are g/m³ or PTB (lb/1000 bbl).

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.* For specific warning statements, see 7.3, 7.4, and 7.11.

2. Referenced Documents

2.1 *ASTM Standards:*²

D381 Test Method for Gum Content in Fuels by Jet Evaporation

D1193 Specification for Reagent Water

D4928 Test Methods for Water in Crude Oils by Coulometric Karl Fischer Titration

D5002 Test Method for Density and Relative Density of Crude Oils by Digital Density Analyzer

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 PTB—lb/1000 bbl.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.03 on Elemental Analysis.

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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.

3.1.2 *salts in crude oil*—commonly, chlorides of sodium, calcium, and magnesium dissolved in crude oil. Other inorganic chlorides may also be present.

4. Summary of Test Method

4.1 This test method measures the conductivity of a solution of crude oil in a mixed alcohol solvent when subjected to an electrical stress. This test method measures conductivity due to the presence of inorganic chlorides, and other conductive material, in the crude oil. A homogenized test specimen is dissolved in a mixed alcohol solvent and placed in a test cell consisting of a beaker and a set of electrodes. A voltage is impressed on the electrodes, and the resulting current flow is measured. The chloride (salt) content is obtained by reference to a calibration curve of current versus chloride concentration of known mixtures. Calibration curves are based on standards prepared to approximate the type and concentration of chlorides in the crude oils being tested.

5. Significance and Use

5.1 This test method is used to determine the approximate chloride content of crude oils, a knowledge of which is important in deciding whether or not the crude oil needs desalting. The efficiency of the process desalter can also be evaluated.

5.2 Excessive chloride left in the crude oil frequently results in higher corrosion rates in refining units and also has detrimental effects on catalysts used in these units.

5.3 This test method provides a rapid and convenient means of determining the approximate content of chlorides in crude oil and is useful to crude oil processors.

6. Apparatus

6.1 The apparatus (see Annex A1) shall consist of a control unit capable of producing and displaying several voltage levels for applying stress to a set of electrodes suspended in a test beaker containing a test solution. The apparatus shall be capable of measuring and displaying the current (mA) conducted through the test solution between the electrodes at each voltage level.

NOTE 1—Some apparatus are capable of measuring voltage and current internally and, after comparison to internal calibration curves, of displaying the resultant concentration.

*A Summary of Changes section appears at the end of this standard.