Designation: D890 – 12 (Reapproved 2022)

Standard Test Method for Water in Liquid Pine Chemicals[1]

This standard is issued under the fixed designation D890; 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 These test methods cover the quantitative determination of dissolved or occluded water present in any proportion in liquid pine chemicals, such as turpentine, pinene, dipentene, pine oil, tall oil, and tall oil fatty acids. Three methods of moisture testing are included. The Karl Fisher titration method is the preferred method for testing tall oil, Test Methods D803.

1.1.1 The Karl Fischer Titration method is based on the reaction between water and a complex reagent[2] consisting of iodine, sulfur dioxide, pyridine, and methanol, whereby the iodine is converted to a colorless compound. The appearance of a persistent iodine color in the reaction mixture indicates the complete removal of free water by reaction with the reagent, and the endpoint may be measured colorimetrically. Automatic titrators find this endpoint by the restoration of a current strength when the resistance provided by the presence of water is eliminated. Amperometric automatic titrators find this endpoint by detecting the current flow that occurs once water is eliminated.

1.1.2 The coulometric titration method determines water content by electronic integration of a current sufficient to generate the precise amount of iodine from the required reagent to react with the water in the sample.

1.1.3 The azeotropic method utilizes the relatively low boiling point of water, as compared with other sample constituents, in a toluene or xylene matrix so that water is collected in a trap and measured.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D803 Test Methods for Testing Tall Oil

D1364 Test Method for Water in Volatile Solvents (Karl Fischer Reagent Titration Method)

3. Significance and Use

3.1 Many pine chemical products contain water as a result of the processes used for their production. Typically refined products such as terpenes, pine oil, tall oil fatty acids, and distilled tall oil contain only traces of water, but crude tall oil might contain 0.5 % to 2.5 % of water. Although the Karl Fischer and coulometric methods are most applicable to low levels of moisture, these can be and are used at higher levels. The azeotropic distillation method is generally used at higher levels.

Moisture By Karl Fischer Titration (Preferred method)

4. Apparatus

4.1 *Titration Vessel,* preferably closed, with stirring capabilities,

4.2 *Buret,* capable of being read at 0.1 mL divisions, or automatic buret, or

4.3 *Automatic Karl Fischer titrator.*

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.34 on Pine Chemicals and Hydrocarbon Resins.

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[2] This procedure has been adapted from the method of Karl Fischer published in *Zeitschrift für Angewandte Chemie*, Vol 48, 1935, p. 395; *Chemical Abstracts*, Vol 29, 1935 p. 6532; as modified by Smith, Bryant, and Mitchell, *Journal*, Am. Chemical Soc., Vol 61, 1939, p. 2407; and further modified by Axel Johansson, *Svensk Papperstidning*, Vol 50, No. 11B, 1947, p. 124; see also *Publication 19* of the Swedish Wood Research Institute, Wood Chemistry and Paper Technique (Stockholm) (1947). Karl Fischer reagent is available from various laboratory supplies. Pyridine-free adaptations of the Karl Fischer reagent are available commercially.

[3] 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.