Designation: D 6942 – 03

Standard Test Method for Stability of Cellulose Fibers in Alkaline Environments[1]

This standard is issued under the fixed designation D 6942; 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 This test method describes a procedure for determining the effect of exposure to alkaline environments on the strength of cellulose fibers. An alkaline environment is defined to be any matrix in which the pH is greater than 8 for a period of 2 or more h.

1.2 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1348 Test Methods for Moisture in Pulp[2]

D 1695 Terminology of Cellulose and Cellulose Derivatives[2]

2.2 *TAPPI (Technical Association of the Pulp & Paper Industry) Standards:*

T 205 Forming Handsheets for Physical Tests of Pulp[3]

T 231 Zero-span Breaking Strength of Pulp (Dry Zero-span Tensile)[3]

3. Terminology

3.1 *Definitions*—For standard terminology of cellulose and cellulose derivatives, see Terminology D 1695.

4. Summary of Test Method

4.1 This test method can be used to compare different cellulose pulp fiber types based on their response to a standard alkaline solution. The stability factor defined below can be used to measure the effect of exposure to alkaline conditions on fiber strength.

4.2 Cellulose fibers are treated with a standard alkaline solution for a specified interval, washed free of alkali, and then formed into standard handsheets (see TAPPI T 205) for strength testing. Zero-span tensile testing (see TAPPI T 231) is used to determine the effect on fiber strength.

4.3 A stability ratio is defined based on the ratio of the zero-span tensile of alkali treated fibers divided by the zero-span tensile of untreated (control) fibers.

5. Significance and Use

5.1 This method is intended to provide a generalized procedure for determining the stability of cellulosic pulp fibers exposed to alkaline environments. Specifically, this method allows various pulp types to be compared with respect to the effect of exposure to alkaline conditions on the strength of individual cellulosic fibers based on a zero-span tensile test. The time intervals listed in the procedure are not critical, and more intervals of shorter or longer duration may be added. In addition, the procedure may be simplified by removing some of the intermediate intervals so long as a range of intervals is determined. An example of a simplified procedure would be to determine 4 intervals (for example, 1 day, 1 week, 2 weeks, 4 weeks; or 1 day, 3 day, 7 day, 14 day).

5.2 The specified solution (1N NaOH) is strongly alkaline. Although this alkali concentration is higher than some environments that would be simulated by this test, the stronger pH provides better differentiation between different cellulose fiber types. Although alkaline stability based on other alkalis (for example, KOH, $Ca(OH)_2$, etc.) at a different concentration could be determined by this method, 1N NaOH is to be considered the standard solution. Alkaline stability results from other treatments may be reported in addition to the standard solution if the additional solution(s) provide useful information.

6. Interferences

6.1 There are no known interferences for this method.

7. Apparatus

7.1 *Handsheeting Apparatus*, as defined in TAPPI T 205.

7.2 *Zero-span Tensile Tester*, as described in TAPPI T 231.

7.3 *Moisture Balance*.

7.4 *Analytical Balance*.

[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 D01.36 on Cellulose and Cellulose Derivatives.

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[2] *Annual Book of ASTM Standards*, Vol 06.03.

[3] Available from Technical Association of the Pulp and Paper Industry (TAPPI), P.O. Box 105113, Atlanta, GA 30348; 15 Technology Parkway South, Norcross, GA 30092.