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Standard Test Method for ALPHA-CELLULOSE IN WOOD¹

This Standard is issued under the fixed designation D 1103; 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 approval.

1. Scope

1.1 This method covers the determination of alpha-cellulose in wood.

2. Principle of Method

2.1 Alpha-cellulose must be determined on an extractive-free, lignin-free wood residue. Since wood is highly lignified, it is accordingly necessary first to subject the material to preliminary treatments to render it amenable to the procedure for alpha-cellulose determination. The extractives are first removed from the wood sample, after which the lignin is removed from the extractive-free wood, leaving a finely divided, porous, white, solid residue of holocellulose, which consists of the hemicellulose and the cellulose of the original wood. The holocellulose is treated with sodium hydroxide and then with acetic acid, and the dried residue is weighed as alpha-cellulose.

3. Apparatus

3.1 *Constant-Temperature Device*—A thermostat or other constant-temperature device will be required that will maintain a temperature of 20 ± 0.1 C in a container large enough to hold a row of at least three 250-ml beakers, kept in an upright position at all times.

NOTE 1—A shallow pan, provided with an inlet tube for running water adjustable as to specified temperature, and provided with an overflow tube to maintain a depth of approximately $\frac{1}{2}$ in. (12.7 mm) of water, has been used for this purpose.

3.2 *Filtering Crucibles*, of Alundum or fritted glass of medium porosity.

4. Reagents

4.1 *Sodium Hydroxide Solution* (17.5 $\pm$

0.1 percent).

NOTE 2—The NaOH solution (17.5 percent), practically free of carbonate, can be conveniently prepared by diluting NaOH solution (50 percent) with distilled water free of CO₂. The NaOH solution (50 percent) may be kept as a stock solution. Sodium carbonate and other insoluble impurities settle out. The supernatant clear solution is diluted to prepare the 17.5 percent solution, the concentration of which shall be 17.5 ± 0.1 percent of NaOH, equivalent to a density of 1.194 ± 0.001 at 15 C or 1.192 ± 0.001 at 20 C.²

4.2 *Sodium Hydroxide Solution* (8.3 percent).

NOTE 3—The NaOH solution (8.3 percent) may be prepared by diluting NaOH solution (50 percent) with distilled water to a density of 1.092 ± 0.001 at 15 C, or 1.090 ± 0.001 at 20 C; or the proper degree of dilution may be obtained as described in Note 5.

4.3 *Acetic Acid* (10 percent)—Mix 1 part by weight of glacial acetic acid with 9 parts of distilled water.

5. Test Specimen

5.1 The test specimen shall consist of 2 g of wood that has been ground to pass a No. 60 (250- μ m) sieve and be retained on a No. 80 (180- μ m) sieve, and then thoroughly air-dried.

6. Procedure

6.1 At the same time the test specimen is weighed, weigh an additional 2-g portion of the air-dry, ground wood into a tared, glass-stoppered weighing bottle. Dry in an oven for 2 h at 100 to 105 C, replace the stopper, and cool in a desiccator. Loosen the stopper to

¹ This method is under the jurisdiction of ASTM Committee D-7 on Wood.

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² International Critical Tables, Vol III, p. 79.