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Brightness loss of bleached pulp

Scope

This method quickly measures the relative brightness loss of pulp by use of heat.
This method does not necessarily agree with a more natural aging test over a longer period of time.
This method has been used on kraft bleached pulps and may or may not be applicable to other pulps.

Applicable documents

TAPPI Test Methods referred to for parts of this procedure include TAPPI T 400 “Sampling and Accepting a Single Lot of Paper, Paperboard, Containerboard, or Related Product” if the pulp is in dry sheet form and TAPPI T 402 “Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Handsheets, and Related Products.”

Forming of handsheets can be performed using TAPPI T 218 “Forming Handsheets for Reflectance Testing of Pulp (Buchner Funnel Procedure)” or TAPPI T 272 “Forming Handsheets for Reflectance Testing of Pulp (Sheet Machine Procedure).”

Reflectance testing on handsheets can be performed using TAPPI T 452 “Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm) or TAPPI T 525 “Diffuse Blue Reflectance Factor of Pulp (Diffuse Brightness).”

Safety precautions

Take care when hanging and removing pads as oven surfaces and clips are hot.

Approved by a Working Group of TAPPI in accordance with the Useful Method Guidelines

Summary

A brightness pad is made from a properly selected specimen of bleached pulp, measured for brightness and then heated in an oven for 4 hours, after which time the brightness pad is again measured for brightness to determine any losses.

Significance

This method provides the advantage of speed at which reversions can be completed and the reproducibility of results. The disadvantage is that dry air is used, disregarding the part of natural aging due to moisture within a bale of pulp.

The reflectance of a sheet composed of fibers is dependent on the structure of the surface and orientation of the fibers. Industrially made pulp sheets have a variety of structures and surface textures and may contain impurities removable in water. The dispersion of the pulp and the forming of a uniform sheet in a repeatable manner is necessary for accurate testing (1).

Reflectance of pulps, particularly unbleached, is affected by pH (2). Accordingly, this method establishes a pH which will be an optimum for most pulps. If however, reflectance must be measured at a specific pH, all water used in preparation of the sheets shall be appropriately adjusted and the actual pH reported.

TAPPI T 218 and TAPPI T 272 may not produce equivalent results. The 150 mesh stainless steel wire screen of the sheet machine may result in the loss of fines which are frequently defined as being able to pass a 200-mesh screen. Dilution factors between the two methods are different and opposite sides of the sheets are tested (2).

Selecting between TAPPI T 218 and TAPPI T 272 should first give consideration to the drainage characteristics of the pulp. For example, recycled or low freeness pulps may require an unreasonable amount of time to remove the excess water from the funnel (T 218) and the fibers may not be dispersed evenly. In that case the sheet machine practice (T 272) would be preferred.

The reflectance of a sheet prepared according to either procedure may not be the same as that of a sheet made from the same pulp under industrial papermaking conditions since pulp fines retention will probably be different and no heat is used to dry the sheet.

Apparatus

1. *Brightness tester*, refer to TAPPI T 452 or TAPPI T 525.
2. *Brightness pad making equipment*, refer to T 218, T272 or other suitable test sheet production procedure.
3. *Oven*, $105 \pm 2^\circ\text{C}$ equipped with wire rack designed to support itself on the shelf bracket inside the oven and small hooks that attach to the wire rack and the handsheets allowing the handsheets to hang freely without touching each other.
4. *Clock or timer*.

Sampling, test specimens and test units

Select a sample of pulp in accordance with a previously determined sampling procedure. If the pulp is in dry sheet form, T 400 is applicable and recommended.

Store samples such that samples are not subject to contamination, a marked change in moisture, or a significant influence of heat or light.

If the pulp is so dry that it will not readily disperse using the high speed mixer, tear about 24 g into small pieces, place in clean disintegrator, add enough prepared water (distilled or deionized, preferably at pH of 6.0 – 7.0) to cover sample, allow to soak for a least 4 h, dilute to 2000 mL, and stir in disintegrator until fibers are well separated, as judged by examining a small quantity diluted with water in a beaker or graduated cylinder. Then handle the pulp as though it had been received as slurry.

To provide the number of test pieces needed for reflectance measurements, weigh out four separate portions of pulp equivalent to 4.0 ± 0.2 g of moisture-free fiber, or measure the corresponding volume of premixed slurry.