

T 207 cm-08

TENTATIVE STANDARD – 1932
OFFICIAL STANDARD – 1933
REVISED – 1975
OFFICIAL METHOD – 1981
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CAUTION:

This method may require the use, disposal, or both, of chemicals which may present serious health hazards to humans. Procedures for the handling of such substances are set forth on Material Safety Data Sheets which must be developed by all manufacturers and importers of potentially hazardous chemicals and maintained by all distributors of potentially hazardous chemicals. Prior to the use of this test method, the user should determine whether any of the chemicals to be used or disposed of are potentially hazardous and, if so, must follow strictly the procedures specified by both the manufacturer, as well as local, state, and federal authorities for safe use and disposal of these chemicals.

Water solubility of wood and pulp

1. Scope

1.1 This test method describes procedures for the determination of the hot and cold water soluble materials in wood and pulp.

1.2 The test for water solubility is normally applied to wood and pulp which are not extracted with organic solvents. However, if prior extraction with organic solvents is desired, a solvent which will dissolve only a minimum amount of the water-soluble material, should be used.

2. Summary

2.1 For the determination of cold water solubility, wood or pulp is extracted with reagent grade water at $23 \pm 2^\circ\text{C}$ with stirring for 48 h.

2.2 For the determination of hot water solubility, wood or pulp is extracted with reagent grade water under reflux in a boiling water bath for 3 h.

3. Significance

3.1 The cold-water procedure removes a part of extraneous components, such as inorganic compounds, tannins, gums, sugars, and coloring matter present in wood and pulp.

3.2 The hot-water procedure removes, in addition, starches.

4. Apparatus

4.1 *Boiling water bath*

4.2 *Stirrer*, magnetic, with glass or Teflon-coated stirring bar. Temperature controlled at $23 \pm 2^\circ\text{C}$.

4.3 *Beaker*, 400 mL.

4.4 *Erlenmeyer flask*, 250 mL, provided with reflux condenser.

4.5 *Filtering equipment*: crucible, alundum or fritted glass, 30-50 mL, medium porosity; filter flask, 500-1000 mL; rubber flange for the crucible; vacuum source.

4.6 *Other equipment*: glass-stoppered weighing bottle; graduated cylinders, 100 mL and 500 mL.

Approved by the Standard-Specific Interest Group for this Standard

5. Sampling and test specimens

5.1 Wood

5.1.1 Prepare according to TAPPI T 257 "Sampling and Preparing Wood for Analysis" about 10 g of air-dry wood meal that passes a 40-mesh screen.

5.1.2 Determine the moisture content on a portion according to TAPPI T 264 "Preparation of Wood for Chemical Analysis."

5.2 Pulp

5.2.1 Obtain a representative 10-g air-dried sample of the pulp and cut or tear in pieces of about 1 cm across.

5.2.2 Determine the moisture content on a portion according to TAPPI T 550 "Determination of Equilibrium Moisture in Paper and Paperboard for Chemical Analysis." This method contains a procedure for small sample sizes for the determination of moisture content.

5.3 If for some reason organic extraction is desired, extract sample with appropriate organic solvent before water extraction.

5.4 For wood or pulp, from the air-dry sample, weigh duplicate 2.0 ± 0.1 -g specimens (moisture-free weight) to the nearest milligram, for either cold-water or hot-water solubility.

6. Procedure

6.1 *Cold water solubility.* Place the specimen in a 400-mL beaker and slowly add 300 mL of distilled water, making sure the wood or pulp is well wetted initially to avoid tendency to float. Carry out extraction at $23 \pm 2^\circ\text{C}$ with constant stirring for 48 h. Transfer the material to a tared filtering crucible which has been previously dried to a constant weight at $105 \pm 3^\circ\text{C}$, wash with 200 mL of cold distilled water, and dry to constant weight at $105 \pm 3^\circ\text{C}$. Place the heated crucible in a tared, loosely-stoppered weighing bottle and cool in a desiccator before weighing.

6.2 *Hot water solubility.* Transfer the specimen to a 250-mL Erlenmeyer flask, add 100 mL of hot distilled water and place in a boiling water bath. Attach the reflux condenser and digest for 3 h, making certain the water level of the bath is held above the stock level in the flask. Transfer the contents of the flask to a tared filtering crucible which has been previously dried to a constant weight at $105 \pm 2^\circ\text{C}$, wash with 200 mL of hot water and dry to constant weight at $105 \pm 3^\circ\text{C}$, as in 6.1.

7. Calculations

7.1 Hot or cold water solubility, % = $[(A-B) / A] \times 100$

Where

A = initial weight of the test specimen, g oven dry (o.d.)

B = weight of the test specimen after extraction, g (o.d.)

8. Report

Report the hot or cold water solubility as the average of two determinations, to the nearest 0.1%. Report whether the method used was hot or cold procedure.

9. Precision

9.1 *Repeatability*, as defined in TAPPI T 1206 "Precision Statement for Test Methods," was found to be as follows:

9.1.1 For cold water solubility of wood (solubility 1.1 to 6.3%): absolute repeatability, 0.14%; relative repeatability, 5.7%.

9.1.2 For cold water solubility of pulp (solubility 0.5 to 2.7%): absolute repeatability, 0.12%; relative repeatability, 9.4%.

9.1.3 For hot water solubility of wood (solubility 0.5 to 2.7%): absolute repeatability, 0.15%; relative repeatability, 3.8%.