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One percent sodium hydroxide solubility of wood and pulp

1. Scope

This method for determination of 1% sodium hydroxide solubility can be applied to wood and to unbleached and bleached pulp.

2. Summary

Wood or pulp is extracted with hot 1% sodium hydroxide solution for 1 h. The loss in weight is determined and calculated as percent solubility.

3. Significance

3.1 Hot alkali solution extracts low-molecular-weight carbohydrates consisting mainly of hemicellulose and degraded cellulose in wood and pulp.

3.2 The solubility of wood could indicate the degree of a fungus decay or of degradation by heat, light, oxidation, etc. As the wood decays or degrades, the percentage of the alkali-soluble material increases (1, 2).

3.3 The solubility of pulp indicates an extent of cellulose degradation during pulping and bleaching processes and has been related to strength and other properties of pulp (3).

4. Apparatus

4.1 *Pulp dispersion apparatus* (as in Fig. 1 or a similar apparatus), consisting of a variable speed motor and a

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stainless steel stirrer with a shell. The speed of the motor and the angle of the blades should be adjusted so that no air is drawn into the pulp suspension during stirring.

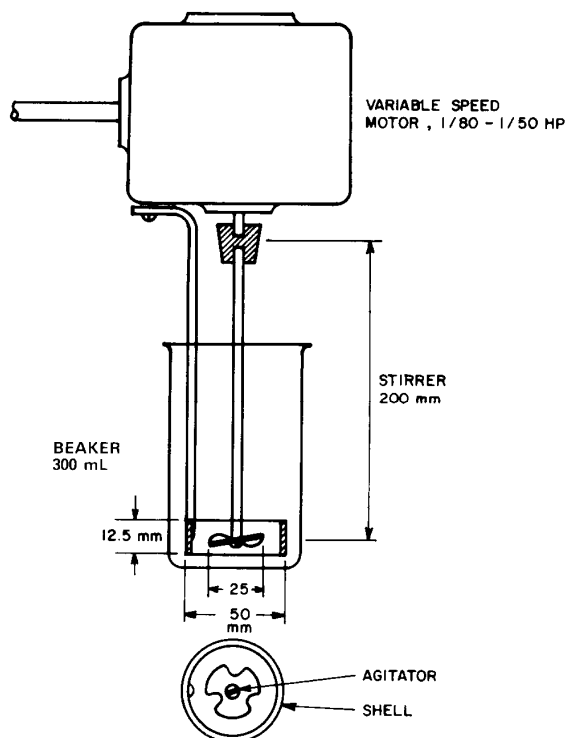


Fig. 1. Pulp dispersion apparatus.

4.2 *Water bath*, designed so that the temperature of the material during treatment is uniformly maintained at 97° to 100°C. The type of bath recommended is one that has a cover with holes of such a size that the beakers used may be placed inside the bath and supported in position by their flared rims.

4.3 *Beakers*, tall form, 200 mL.

4.4 *Filtering crucibles*, 30 mL, medium porosity (nominal maximum pore size 10-15µm). Dry before use in an oven at 105° ± 3°C for 60 min, cool in a desiccator, and weigh.

4.5 *Filtering flasks*, 1000 mL.

4.6 *Other equipment*: graduated cylinder, 100 mL; watch glasses; stirring rods; thermometer, vacuum source.

5. Reagents

5.1 *Sodium hydroxide solution*, 1.0% ± 0.1% NaOH (0.25N). Dissolve 10.0 g of solid NaOH in water and dilute to 1000 mL. Determine normality of the solution by titration with a standard acid according to TAPPI T 610 "Preparation of Indicators and Analytical Reagents and Standardization of Volumetric Solutions" and adjust to 0.25 ± 0.025N.

5.2 *Acetic acid*, 10%. Dilute 100 mL of glacial CH₃COOH with water to 1000 mL.

6. Safety precautions

Sodium hydroxide is a strong caustic. Solutions of sodium hydroxide are corrosive and damaging to human skin. Great care should be taken when handling the sodium hydroxide solution in this method.