

Australian/New Zealand Standard™

Methods of test for pulp and paper

Method 201s: Kappa number of pulp



AS/NZS 1301.201s:2002

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The following are represented on Committee PK-019:

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Forest Research (New Zealand)
National Association of Forest Industries
New Zealand Pulp and Paper Industry Association
Printing Industries Association of Australia
Pulp and Paper Manufacturers Federation of Australia

Additional interests participating in the preparation of this Standard:

Paper manufacturers
Pulp manufacturers
Research interests
Manufacturers of paper testing instruments
Suppliers of paper testing instruments

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Foreword

This standard was prepared by Joint Technical Committee PK-019, Methods of Test for Pulp and Paper, as a part of AS/NZS 1301, *Methods of test for pulp and paper*.

This edition cancels and replaces AS 1301.P201m—1986.

This revision is necessary to include a method for the determination of Kappa number of moist pulps. The procedure has also been changed to ensure that the initial reaction volume is as close as practicable to the final value, by minimizing the volume of water used for rinsing.

Since 1986 the 'P' has been omitted from the AS 1301 number identification, but until all AS 1301 standards are reprinted the 'P' will continue to appear in some of them.

Introduction

The Kappa Number is the number of millilitres of 0.02 M potassium permanganate solution which would be consumed by 1 gram of moisture free pulp under the conditions specified in this standard. The results are corrected to 50% consumption of the permanganate.

This method conforms with ISO 302:1981 except that the ISO method does not allow the measurement of Kappa number on moist pulps. Other similar methods are TAPPI T236om-99, PAPTAC G.18 (1997) and SCAN C1:00.

Kappa number of pulp

1 Scope

This method provides an indirect measure of the relative bleachability, or residual lignin content of pulp. It may be used for all types and grades of chemical and semi-chemical unbleached and semi-bleached wood pulps obtained in yields under 60%. The method may also be used as a laboratory control technique for well screened pulps obtained in higher yields up to 70%. It should be noted that reproducibility is less for high yield pulps than for low yield pulps.

2 Principle

Disintegrated pulp is allowed to react with a specified amount of potassium permanganate solution for a given time. The amount of pulp is chosen so that about 50% of the permanganate is consumed during the reaction. The reaction is terminated by the addition of potassium iodide solution, and the free iodine is titrated with sodium thiosulfate solution. The results are corrected to exactly 50% consumption of permanganate.

3 Apparatus

3.1 Mechanical stirrer, propeller-type made of glass or other non-corrosive material (a plastic-covered, or glass-covered magnetic stirrer may be used instead).

3.2 Reaction vessel, of 1500 to 2000 mL capacity. It may be a glass beaker, or a container made of other non-corrosive transparent or white material, e.g. Porcelain.

3.3 Wet disintegration apparatus, e.g. British Standard disintegrator, Waring blender or Turmix or similar apparatus suitable for disintegrating pulp until fibre clots or bundles are completely broken down.

3.4 Heating device, e.g. constant temperature bath, capable of maintaining a temperature of $25.0 \pm 0.5^\circ\text{C}$ in the reaction vessel.

3.5 Buchner funnel, or similar sheet mould device where the fines can be recirculated.

3.6 Burette, 50 mL, graduated to 0.1 mL.

NOTE 1 — An autotitrator may be used as an alternative to a burette provided it can be demonstrated that comparable results are obtained.

3.7 Timer, capable of measuring 10 mins to the nearest 1 s.

4 Reagents

4.1 Purified water, i.e. distilled or deionized water or water of equivalent quality.

4.2 Potassium permanganate solution, standardized, 0.0200 ± 0.0001 M (3.161 g/L). The potassium permanganate solution should be restandardized weekly and discarded if it does not conform to the limits specified.

NOTES

2 — It is convenient to dissolve slightly more than the theoretical amount of analytical-grade potassium permanganate, KMnO_4 , in purified water (e.g. 3.25 g/L) and then, after standardization add the calculated amount of any additional water required to bring solution strength within the specified limits. A confirmatory standardization titration should then be made. Analytical grade sodium oxalate is the preferred reference material for the standardization, but titration against the 0.2 M sodium thiosulfate is a satisfactory alternative provided the latter has been freshly standardized against a primary reference substance.