



Standard Test Method for Determination of Alkalinity of Paper as Calcium Carbonate (Alkaline Reserve of Paper)¹

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1. Scope

1.1 This test method covers the determination of the alkalinity or alkaline reserve of paper, or both.

1.2 A qualitative test is described that indicates the presence of carbonate. (The detection limit is approximately 5 % calcium carbonate.)

1.3 A qualitative test is described that determines the alkalinity expressed as percent calcium carbonate or alkaline reserve, or both, expressed as moles per kilogram of paper.

NOTE 1—A similar procedure for measuring the alkalinity or alkaline reserve or both of paper will be found in ISO 10716.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, or Related Products²

D 644 Test Method for Moisture Content of Paper and Paperboard by Oven Drying²

D 1968 Terminology Relating to Paper and Paper Products²

2.2 ISO Standard:

ISO 10716 Paper and Board—Determination of Alkali Reserve³

2.3 TAPPI Standards:

T 266 Determination of Sodium, Calcium, Copper, Iron, and Manganese in Pulp and Paper by Atomic Absorption Spectroscopy⁴

T 610 Preparation of Indicators and Standard Solutions⁴

3. Terminology

3.1 For the meaning of terms used in this test method,

consult Terminology D 1968, or *The Dictionary of Paper*.⁴

4. Summary of Test Method

4.1 *Qualitative Test*—The presence of carbonate is determined by immersing a sample of the paper in hydrochloric acid and observing effervescence. Any carbonate or bicarbonate salt present will produce this effect.

4.2 *Quantitative Determination of Carbonate*—The paper sample is subjected to digestion in a known quantity of standardized hydrochloric acid. Back titration with standardized sodium hydroxide is used to determine the amount of hydrochloric acid consumed in the digestion process. The subsequent calculation for alkalinity assumes that all of the alkaline material neutralized was calcium carbonate. The calculation of moles per kilogram is independent of the material providing the reserve.

5. Significance and Use

5.1 Growing concern regarding the deterioration of books and various documents in libraries and archives have led to the development of standards by standard-setting bodies for improved permanence in paper. By using alkaline sizing technology, it is possible to manufacture paper at a pH of 6.5 or above and, therefore, incorporate alkaline fillers such as calcium carbonate. Alkaline sizing in itself improves permanence by eliminating acid from the sheet normally associated with a rosin/alum sizing system. The presence of an alkaline filler gives an added measure of permanence because it has the capability of sorbing acidic gases from the environment that might otherwise cause deterioration of the paper.

5.2 Various paper product specifications specify an alkali reserve, frequently at a minimum of 2 % calcium carbonate. An alkaline reserve of 0.4 mol/kg is provided by 2 % calcium carbonate.

5.3 The qualitative test can be used to determine the presence of carbonate, although this may not necessarily confirm that the paper is alkaline-sized or that the filler is calcium carbonate. A paper sized with a rosin/alum system and coated with a coating containing any carbonate salt would give a positive qualitative reaction. Carbonate levels of less than 5 % may not show positive results.

5.4 The quantitative test assumes that the carbonate is calcium and reports as such.

5.5 If the sample is known to contain no other carbonate or

¹ This test method is under the jurisdiction of ASTM Committee D-6 on Paper and Paper Products and is the direct responsibility of Subcommittee D06.92 on Test Methods.

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² *Annual Book of ASTM Standards*, Vol 15.09.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁴ Available from the Technical Association of the Pulp and Paper Industry, P.O. Box 105113, Atlanta, GA 30348.