



Designation: D3897 – 17

Standard Practice for Calculation of Basicity of Chrome Tanning Liquors¹

This standard is issued under the fixed designation D3897; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This practice is intended to show how the results of the chromium analysis (Test Methods [D3898](#) or [D6019](#)) and the acidity determination (Test Method [D3913](#)) can be combined to permit calculation of the basicity of a chrome tanning liquor.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D3898](#) Test Method for Chromic Oxide in Basic Chromium Tanning Liquors

[D3913](#) Test Method for Acidity in Basic Chromium Tanning Liquors

[D6019](#) Test Method for Determination of Chromic Oxide in Basic Chromium Tanning Liquors (Ammonium Persulfate Oxidation)

3. Significance and Use

3.1 Basicity is a ratio. In any chromic salt solution, the electrovalence of the chromium (+3) is satisfied by the hydroxyl ions and by acid ions. The extent to which this

¹ This practice is under the jurisdiction of ASTM Committee [D31](#) on Leather and is the direct responsibility of Subcommittee [D31.06](#) on Chemical Analysis.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

electrovalence is satisfied by the hydroxyl ions, expressed as a percentage, is the basicity. The basicity of a chrome tanning liquid is closely related to the tanning behavior of the solution.

4. Procedure

4.1 Determine the chromic oxide as described in Test Method [D3898](#) or [D6019](#). Determine the acid as described in Test Method [D3913](#).

5. Results

5.1 The basicity of the liquor shall be expressed according to the Schorlemmer system. In this system, the basicity is the per cent of the total chromic oxide that is combined with hydroxyl and is calculated as follows:

$$\text{Basicity, \%} = \frac{A - B}{A} \times 100 \quad (1)$$

where:

A = the amount of thiosulfate, as mL of 0.1 N solution required to titrate the 25 mL aliquot as the specimen in Test Methods [D3898](#) or [D6019](#),

B = the amount of sodium hydroxide, as mL of 0.1 N solution required to titrate the 25 mL aliquot of the specimen in Test Method [D3913](#).

6. Precision and Bias

6.1 Because basicity is in effect a ratio, the precision indexes are transmitted by the laws governing ratios. If the precision of accuracy of the chromic oxide determination or of the titratable acidity is expressed in the same relative units; for example, percent of value being determined, the precision with which the basicity is known will be:

$$P_B = \sqrt{P_{C_r}^2 + P_A^2} \quad (2)$$

where:

P_A = precision of acidity in basic chromium tanning liquors,

P_{C_r} = precision of chromic oxide in basic chromium tanning liquors,

P_B = precision of basicity in basic chromium tanning liquors.

6.2 For the reported reproducibility figures for the chromic oxide from Test Method [D3898](#) ($\delta = 0.90\%$) and for acidity