

Designation: D3897 - 91 (Reapproved 2012)

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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

- 1.1 This practice is intended to show how the results of the chromium analysis (Test Method D3898) 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 and health practices and determine the applicability of regulatory limitations prior to use.

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

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 electravalence 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. 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:

Basicity,
$$\% = \frac{A - B}{A} \times 100$$
 (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 Method D3898,
- 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:

$$P_{B} = \sqrt{P_{C_{B}}^{2} + P_{A}^{2}} \tag{2}$$

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

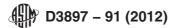
6.2 For the reported reproducibility figures for the chromic oxide from Test Method D3898 (δ = 0.90 %) and for acidity from Test Method D3913 (Procedure I, σ = 1.84 %), δ_B is given as 2.05 %. This number has the units of basicity. Similarly, repeatability has δ = 0.52 % basicity. Caution should be employed in insisting on extremely close agreements between laboratories or replicates unless a background of high precision has been established.³

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.

Current edition approved April 1, 2012. Published April 2012. Originally approved in 1991. Last previous edition approved in 2006 as D3897 - 91(2006). DOI: 10.1520/D3897-91R12.

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.

³ Hartford, W. H., *The Journal of the Leather Chemists Assoc.*, Vol 56, 1961, p. 568.



7. Keywords

7.1 basicity; chrome tanning liquor; Schorlemmer

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).