Association of Textile, Apparel & Materials Professionals

AATCC takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this test method. Users of this test method 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 test method is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reaffirmed or withdrawn. Your comments are invited either for revision of this test method or for additional procedures and should be addressed to the AATCC Technical Center. 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 Diana A. Wyman, Technical Director, at the address shown below.

This test method is copyrighted by AATCC, PO Box 12215, Research Triangle Park, NC 27709 USA. Individual reprints (single or multiple copies) of this method may be obtained by contacting AATCC at the above address or tel: 919-549-3526; fax: 919-549-8933, or e-mail: orders@aatcc.org.

AATCC License Agreement: This test method is copyrighted by the American Association of Textile Chemists and Colorists (AATCC), PO Box 12215, 1 Davis Drive, Research Triangle Park, NC USA. All rights reserved.

AATCC grants you a license as follows: The right to download one electronic file of this AATCC test method for temporary storage on one computer for purposes of viewing, and/or printing one copy of the AATCC test method for individual use. Neither the electronic file nor the hard copy print may be reproduced in any way. In addition, the electronic file may not be distributed elsewhere over computer networks or otherwise. The hard copy print may only be distributed to other employees for their internal use within your organization.

This test method is not for resale.

Documents
Document Sharing Hub

Copyright The American Association of Textile Chemists and Colorists
Provided by IHS Markit under license with AATCC
No reproduction or networking permitted without license from IHS
Full document details: AATCC 149 2019

Licensee=Hong Kong Polytechnic University/9976803100, User=ERIKSSON, Anna Pernil
Not for Resale, 03/03/2020 11:43:37 MST

Test Method for Chelation Value of Aminopolycarboxylic Acids and Their Salts: Calcium Oxalate

Developed in 1976 by AATCC Committee RR90; editorially revised and reaffirmed 1977, 1985 (with title change), 1997; reaffirmed 1980, 2002, 2007, 2012; editorially revised 1984, 1986, 1988 (with title change), 2010, 2019; revised 1992, 2018 (with title change).

Foreword

The titration in this method yields a value that includes partially-substituted EDTA, HEDTA, DTPA, nitrilotriacetic acid (NTA), iminodiacetic acid (IDA), glycolate and other weak chelating agents found in some commercial products. An alternative procedure, excluding the effect of partially-substituted products, is provided in AATCC TM168, Test Method for Chelation Value of Polyaminopolycarboxylic Acids and Their Salts: Copper PAN.

1. Purpose and Scope

1.1 The active content of ethylenediaminetetraacetic acid (EDTA), N-hydroxyethylethylenediaminetriacetic acid (HEDTA) and diethylenetriaminepentaacetic acid (DTPA) and their salts is usually expressed by the calcium chelation value (CaCV). This value indicates the amount of calcium (as calcium carbonate) which will be chelated by a known weight of chelating agent.

2. Principle

2.1 The chelation value is determined experimentally by titrating a weighed sample of chelating agent with a calcium ion solution of known concentration. A precipitating anion (oxalate) is present during the titration. As the calcium solution is added, the ions are chelated by the chelating agent and no permanent precipitate is formed as long as there is free chelating agent present. Beyond this point, any excess calcium ion that is added reacts with oxalate anion to form a cloudy precipitate which is the endpoint.

2.2 The CaCV indicates the amount of calcium (as calcium carbonate) that will be sequestered by a known weight of chelating agent and is expressed as milligrams of calcium carbonate ($CaCO_3$) per gram of chelating agent (mg calcium carbonate/g chelating agent).

3. Terminology

3.1 **chelating agent,** n.—*in textile chemistry*, a chemical capable of deactivating metal ions by formation of a water-soluble complex. SYN.—*sequestering agent*.

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

4.2 All chemicals should be handled with care.

4.3 In preparing, dispensing and handling hydrochloric acid and sodium hydroxide use chemical goggles or face shield, impervious gloves and an impervious apron. Concentrated acids should be handled only in an adequately ventilated laboratory hood. CAUTION: Always add acid to water.

4.4 Diethylamine hydrochloride is an eye, skin and respiratory irritant. It should be handled only in an adequately ventilated hood.

4.5 An eyewash/safety shower should be located nearby and a self-contained breathing apparatus should be readily available for emergency use.

4.6 Exposure to chemicals used in this procedure must be controlled at or below levels set by governmental authorities (e.g., Occupational Safety and Health Administration's [OSHA] permissible exposure limits [PEL] as found in 29 CFR 1910.1000; see www.osha.gov for latest version). In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) comprised of time weighted averages (TLV-TWA), short term exposure limits (TLV-STEL) and ceiling limits (TLV-C) are recommended as a general guide for air contaminant exposure which should be met (see 15.1).

5. Uses and Limitations

5.1 Analysis by this method will yield a CaCV that includes partially-substituted EDTA, HEDTA and DTPA as well as nitrilotriacetic acid (NTA), iminodiacetic acid (IDA), glycolate and other weak chelating agents. These compounds may be present in some commercial products.

5.2 AATCC TM168 is an alternative procedure that yields a CaCV that does not include the partially-substituted products and weaker chelating agents.

6. Reagents

6.1 Calcium carbonate ($CaCO_3$).

6.2 Sodium oxalate ($Na_2C_2O_4$).

6.3 Diethylamine hydrochloride [$(C_2H_5)_2NH \cdot HCl$]

6.4 Sodium hydroxide (NaOH) solution, 50% W/W.

6.5 Hydrochloric acid (HCl) conc.

7. Sampling

7.1 Conduct the test in triplicate; i.e., analyze 3 test specimens from a sample.

8. Specimens

8.1 Do not use aluminum or metallic weighing pans.

8.2 For analysis of solid EDTA, HEDTA and DTPA (either free acid or salt forms) weigh a 0.49-0.51 g specimen of the dried chelating agent to an accuracy of 0.01 g.

8.3 For analysis of commercial solutions of salts of the chelating agents in 8.2 weigh a 1.00-1.20 g specimen of the solution to an accuracy of 0.01 g.

9. Conditioning

9.1 If solid chelating agent is being evaluated, dry a 2-g sample at the appropriate temperature for at least 2 h and cool in desiccator before weighing specimens.

9.2 Dry free acid forms of chelating agents at 120°C.

9.3 Dry salt forms of chelating agents at 80°C.

10. Preparation of Reagents

10.1 Calcium Titrant Solution (0.250 M): Weigh 25.0 g of calcium carbonate to an accuracy of 0.1 g and add it to 300 mL of water in a 600-mL beaker with

Documents
Document Sharing Hub
Copyright The American Association of Textile Chemists and Colorists
Provided by IHS Markit under license with AATCC
No reproduction or networking permitted without license from IHS
Full document details: AATCC 149 2019
Copyright © 2019 American Association of Textile Chemists and Colorists
Licensee=Hong Kong Polytechnic University/9970803100, User=ERIKSSON, Anna Pernil
Not for Resale, 03/03/2020 11:43:37 MST