



**American Water Works
Association**

The Authoritative Resource for Safe Drinking Water®

ANSI/AWWA B451-04
(Revision of ANSI/AWWA B451-98)

AWWA Standard

Poly(Diallyldimethyl- ammonium Chloride)



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6666 West Quincy Avenue
Denver, CO 80235-3098
T 800.926.7337
www.awwa.org

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Committee Personnel

The AWWA Standards Committee on Polyelectrolytes, which developed, reviewed, and approved this standard, had the following personnel at the time of approval:

Francis J. Mangravite, *Chair*

Consumer Members

T.A. Barber Jr., Coca-Cola Company, Atlanta, Ga.	(AWWA)
O.J. Dzydzora Sr., East Stroudsburg, Pa.	(AWWA)
Sun Liang, Metropolitan Water District of Southern California, La Verne, Calif.	(AWWA)
S.R. Lohman, Denver Water, Denver, Colo.	(AWWA)
J.C. Routt, Kentucky-American Water Company, Lexington, Ky.	(AWWA)
C.K. Schreppe, Mohawk Valley Water Authority Laboratory, Utica, N.Y.	(AWWA)

General Interest Members

F.L. Hinker, Santa Rosa, N.M.	(AWWA)
W.D. Laraway, MPL Services Inc., Long Valley, N.J.	(AWWA)
R.D. Letterman, Syracuse University, Syracuse, N.Y.	(AWWA)
F.J. Mangravite, Public Works Management Inc., Morris Plains, N.J.	(AWWA)
T.J. McCandless, * Standards Engineer Liaison, AWWA, Denver, Colo.	(AWWA)
C.C. Pintner, Germantown, Tenn.	(AWWA)
D.R. Purkiss, NSF International, Ann Arbor, Mich.	(AWWA)

Producer Members

F.W. Barvenik, Cytec Industries Inc., Weston, Conn.	(AWWA)
B.S. Johnson, Ondo Nalco Company, Naperville, Ill.	(AWWA)
C.B. Lind, General Chemical Corporation, Parsippany, N.J.	(AWWA)
George Tichenor, SNF Chemtall, Riceboro, Ga.	(AWWA)

* Liaison, nonvoting

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA B451.

I. Introduction.

I.A. *Background.* Chemical clarification methods have been used to improve the quality of drinking water supplies since the late 1880s. In 1967, the first completely synthetic organic polyelectrolyte was accepted by the US Public Health Service for use in treating potable water. The responsibility for accepting additives for drinking water treatment was subsequently assumed by the US Environmental Protection Agency (USEPA) and administered by their Office of Drinking Water as an advisory program. USEPA's acceptance was made by the specific name of the suppliers' product and not by generic type. Poly(diallyldimethylammonium chloride)* (CAS[†] No. 26062-79-3) is one of several types of synthetic organic polyelectrolytes that was accepted for use in potable water treatment under this program, which was discontinued in 1990.

PolyDADMAC polymers are a family of synthetic cationic organic polyelectrolytes (also called polymers or coagulants) used in water treatment to improve the performance of some unit operations in the treatment process, most often by increasing the extent or rate of liquid–solids separation. The DADMAC monomer used to make PolyDADMAC is made from two chemicals: allyl chloride and dimethylamine (DMA). PolyDADMAC polymers have a cationic charge, a high relative charge density, low-to-medium relative molecular weights, and are manufactured and sold in aqueous solution form.

The important concepts to remember regarding polyDADMAC polymers include the following:

1. PolyDADMAC polymers are similar to EPI-DMA polyamines (ANSI/AWWA B452) in their use, handling, storage, and solution preparation.
2. PolyDADMAC polymers are different from polyacrylamide (PAM) polymers (ANSI/AWWA B453) in their use, handling, storage, and solution preparation.
3. PolyDADMAC polymers are supplied in a solution form that may also be referred to as liquid or aqueous solutions.

*Diallyldimethylammonium chloride is hereinafter abbreviated "DADMAC." Poly(diallyldimethylammonium chloride) is abbreviated "polyDADMAC."

[†]Chemical Abstracts Service, 2540 Olentangy River Rd., P.O. Box 3012, Columbus, OH 43210.

4. PolyDADMAC polymers are a family of polymers with a relatively constant charge type and charge density but with different molecular weights. They are essentially linear in structure.

5. The physical properties of polyDADMAC polymers cannot be used to judge product performance; only laboratory testing, pilot plant studies, or full-scale plant trials can discern product efficacy.

6. PolyDADMAC polymers may contain inactive ingredients, such as sodium chloride, depending on the manufacturing method and formulation.

The user should consult the material safety data sheet (MSDS) for product composition information regarding any specific polyDADMAC polymer product.

I.B. History. The AWWA Standards Council authorized the development of this standard in 1979. The standard was developed by the AWWA Standards Committee on Polyelectrolytes and was approved by the AWWA Board of Directors on June 14, 1987. The second edition of the standard was approved by the Board of Directors on June 18, 1992. The third edition of the standard was approved on Jan. 25, 1998. This edition of the standard was approved by the Board of Directors on June 13, 2004.

I.C. Acceptance. In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the original consortium included the American Water Works Association Research Foundation (AWWARF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.* Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including two standards developed under the

*Persons outside the US should contact the appropriate authority having jurisdiction.

direction of NSF, NSF*/ANSI[†] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 60. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI 60 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of “unregulated contaminants” are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA B451 addresses additives requirements in Sec. 4.3 of the standard. The transfer of contaminants from chemicals to processed water or the residual solids is becoming a problem of great concern. The language in Sec. 4.3.3 is a recommendation only for direct additives used in the treatment of potable water to be certified by an accredited certification organization in accordance with NSF/ANSI 60 Drinking Water Treatment Chemicals—Health Effects. However, users of the standard may opt to make this certification a requirement for the product. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by all parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

II. Special Issues.

II.A. *Safety.* Homopolymers of DADMAC are not considered to be toxic as household products nor are they considered primary skin or eye irritants by the consumer product safety commission (US Federal Hazardous Substances Act). Good housekeeping procedures and personal cleanliness are recommended when handling polyDADMAC.

* NSF International, 789 N. Dixboro Rd., Ann Arbor, MI 48105.

† American National Standards Institute, 25 W. 43rd St., Fourth Floor, New York, NY 10036.