

# Sodium Dichloro-S-Triazinetrione (Dichlor)

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*Brought to you by the APSP Recreational Water Quality Committee*

## I. INTRODUCTION

The purpose of this fact sheet is to provide a generic technical overview of the chemical product dichloro-s-triazinetrione (dichlor), which is marketed for use in the treatment of water in swimming pools, spas, and hot tubs.

## II. SUMMARY OF CHARACTERISTICS

- Provides a residual level of free available chlorine in pool and spa water to kill disease causing organisms
  - a. Use provides cyanuric acid, which stabilizes free chlorine
- Acts as a sanitizer, algaecide and/or shock (granular) product depending on application method
- Destroys contaminants in pool and spa water such as those found in sweat, urine and wind-blown debris
- Proper application gives excellent water clarity
- Completely soluble in water
- Does not contain calcium
- Does not contribute to scaling; suitable for use in pools and spas with hard water
  - b. May slightly reduce pH and total alkalinity

## III. GENERAL DESCRIPTION

Sodium dichloro-s-triazinetrione is available in two forms – dihydrate and anhydrous. The available chlorine contents of the dihydrate and the anhydrous chemicals are 56% and 62%, respectively. Anhydrous dichlor is an NFPA Class 3 oxidizer. Dichlor dihydrate has a lower hazard rating of NFPA Class 1. Both forms require attention to instructions for application, storage and handling. Dichloro-s-triazinetrione is also known as

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dichloroisocyanurate, dichloroisocyanuric acid, or dichlor for short. Dichloroisocyanuric acid is an EPA-registered pesticide sold for use as a sanitizer for pools and spas.

Dichlor is soluble in water, forming hypochlorous acid and hypochlorite ion or free available chlorine (FAC). Hypochlorous acid is more effective as a biocide than hypochlorite ion. The relative amounts of hypochlorous acid and hypochlorite will depend on pH. Therefore, always maintain the pH between the recommended values of 7.2 and 7.8. The biocidal properties of dichlor are due principally to hypochlorous acid, which kills bacteria, algae, and other microorganisms. Because a residual level of FAC can be maintained with the use of dichlor, it is classified as a primary sanitizer.

Dichlor is typically sold in granular form. This provides a simple and convenient way to chlorinate pools and spas. Dichlor is completely soluble in water and does not generate insoluble solids. Also, dichlor does not contribute to scaling. Thus, the dichlor products are suitable for hard water. Dichlor is typically sold by the manufacturer as a granular product with free available chlorine content depending on which form is used (dihydrate or anhydrous). Dichlor is available with additives which may provide some additional benefit to the user. However, it is important to note that if additives are mixed with the product, the available chlorine will be less than 56% or 62%. The available chlorine content is provided on product labels.

In addition to its use as a primary sanitizer, dichlor can perform additional water treatment functions to control algae and to oxidize contaminants and chloramines. If the proper concentration of free chlorine (1.0 ppm – 4.0 ppm) is maintained in the pool with dichlor, the swimming pool water will be properly sanitized, that is, the bacteria will be killed fast enough to control their populations in the pool water. The free chlorine concentration for spas should be 2.0 – 5.0 ppm. The free chlorine generated from dichlor helps provide clear water by killing algae and by destroying organic matter that will cloud the water if allowed to build up. Chloramines, the most common cause of unpleasant odors, are also eliminated by the action of free chlorine.

When dichlor is used 0.9 ppm of cyanuric acid is added to the water for each ppm of available chlorine added. A certain amount of cyanuric acid (usually within the range of 30 ppm – 50 ppm) is necessary to protect outdoor pools from degradation by sunlight. When the recommended level of cyanuric acid is maintained, it slows down the degradation of free chlorine by sunlight and enables the free chlorine to last 3 - 4 times longer than free

chlorine in outdoor pools without cyanuric acid. The effect of cyanuric acid on slowing the oxidation of organics, kill rates of bacteria, viruses and algae has been demonstrated, primarily in controlled laboratory studies.

Cyanuric acid is a very stable molecule and does not readily degrade in swimming pools and spas. If the cyanuric acid level exceeds the APSP maximum of 100 ppm, it is recommended to perform a partial drain and refill. Draining has the advantage of removing contaminants that have built up through use of the pool or spa and is recommended as a periodic practice for all pools and spas to control the total dissolved solids.

#### IV. APPLICATION

The ways that dichlor products are used depend upon the purpose of application and the product form. The EPA registered product label will have explicit use instructions that describe how to apply the material for specific application purposes. Dichlor is typically applied by broadcasting the product directly into the water. Those requirements will be explained on each label.

The amount of product to be used or dispensed depends upon the specific application and the volume of water being treated. For example, in routine sanitizing use, the objective is to maintain a residual available chlorine (FAC) concentration of 1.0 ppm – 4.0 ppm for pools and 2.0 ppm – 5.0 ppm for spas. The label use instructions will explain how to determine a typical dosage for the water volume to be treated. Label use instructions will similarly define dosage requirements for other product applications such as oxidation, shock treatment or superchlorination.

The requirements for pool water testing in the application of dichlor based products should be indicated on the product label. The primary parameter to be tested is the level of FAC in the water. The choice of testing methods will vary depending on the type of pool (residential or commercial) and local regulations and standards. The product label should recommend that the pool water quality be properly balanced. This requires testing of the pool water balance parameters of pH, alkalinity, calcium hardness, and stabilizer (i.e., cyanuric acid).

Granular dichlor is often used to treat black algae that commonly grow in the cracks and crevices of the pool surfaces. Granular dichlor is acceptable for use in vinyl-lined pools for this purpose provided the user follows the instructions provided on the product label.

## V. PRECAUTIONS

In order to safely use and handle dichlor products, all individuals involved in their manufacture, distribution, sale, use should be trained and knowledgeable about their properties. Safety information is available on the product label, product MSDS (Material Safety Data Sheet), and manufacturer's training materials. This safety information will include product and packaging disposal instructions and spill response information.

Dichlor is a dry solid with strong oxidizing properties. It is stable when stored in a cool, dry, ventilated area and not contaminated by other chemicals such as acids or easily oxidizable materials. Dichlor, in the solid form, shall not be mixed with other pool chemicals including other chlorinating agents. Partially empty packages must not be consolidated, as this could result in dangerous mixing with incompatible dry chlorinating agents having a similar appearance.

*CAUTION: If mishandled, improperly stored, or contaminated, dichlor products can become unstable and dangerous, as is the case in general with chlorinating agents. Fire, explosion and/or evolution of toxic gasses could result, depending on the nature and amount of the contaminant.*

As with any oxidizer, dichlor can oxidize metals and may result in staining of pool and spa surfaces.

## VI. REFERENCES

1. National Fire Protection Association, NFPA 400 Hazardous Materials Code, 2010 Edition, Annex G
2. Appendix A, ANSI/APSP-1, ANSI/APSP-2, ANSI/APSP-3, ANSI/APSP-4, ANSI/APSP/ICC-5, ANSI/APSP-6 standards, Association of Pool and Spa Professionals, 2111 Eisenhower Ave., Alexandria, Virginia 22314.

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3. ANSI/NSPI-3 1992, *Standard for Permanently Installed Residential Spas*, Association of Pool and Spa Professionals, 2111 Eisenhower Ave., Alexandria, Virginia 22314.
4. Kirk-Othmer *Encyclopedia of Chemical Technology*, 3<sup>rd</sup>. ed., Vol. 24 (1984), pp. 427-441, "Treatment of Swimming Pools, Spas and Hot Tubs," J. Wojtowicz, J. P. Faust and F. Brigano.
5. Hammond, B. G. et al, "A Review of Toxicology Studies on Cyanurate and its Chlorinated Derivatives," *Environmental Health Perspectives*. Vol. 69, pp. 287-292, 1986.
6. "Safe Storage and Handling of Swimming Pool Chemicals", EPA 550-F-01-003, United States Environmental Protection Agency (EPA), Office of Waste and Emergency Response, March 2001.  
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