

# Trichloro-S-Triazinetrione (Trichlor)

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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 trichloro-s-triazinetrione (trichlor), which is marketed for use in the treatment of water in swimming pools, spas, and hot tubs.

## II. SUMMARY OF CHARACTERISTICS

- Highest available chlorine content of solid chlorine sanitizers
- Use provides cyanuric acid, which stabilizes free chlorine
- A concentrated source of chlorine in solid form
- Provides a residual level of free available chlorine in pool and spa water to kill disease causing organisms
- Acts as a sanitizer, algacide 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
- Available in slow-dissolving tablet, stick or granular form
- Completely soluble in water
- pH and alkalinity of treated water may drift down
- Does not contain calcium
- Suitable for use in pools and spas with hard water

## III. GENERAL DESCRIPTION

Trichloro-s-triazinetrione is a dry solid containing the highest (90%) available chlorine content of any chlorine sanitizing pool treatment chemical except gaseous chlorine (100%).

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This chemical is also known as trichloroisocyanuric acid or trichlor for short. Trichloroisocyanuric acid is an EPA-registered pesticide sold for use as a sanitizer for pools and spas.

Trichlor 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 trichlor 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 trichlor, it is classified as a primary sanitizer.

Trichlor is sold in tablet, stick and granular forms. These forms provide several simple and convenient ways to chlorinate pools and spas continuously. Trichlor tablets, sticks, and granules are completely soluble in water and do not generate insoluble solids. Also, trichlor does not contribute to scaling. Thus, the trichlor products are suitable for hard water. Trichlor is typically sold by the manufacturer as a granular product with 99% purity. Trichlor tablets, the most common form, are usually made from the unadulterated granular product and will contain at least 0.90 lb available chlorine per pound of product. This is equivalent to 0.9 lb of gaseous chlorine and is the reason that the label indicates that the product contains 90% available chlorine. Trichlor products are available with additives which may provide additional benefits to the user. However, it is important to note that if additives are mixed with the product, the available chlorine will be less than 90%. The available chlorine content is provided on product labels.

In addition to its use as a primary sanitizer, trichlor 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 trichlor, 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 trichlor helps provide clear water by killing algae and by destroying organic matter that will cloud the water if allowed to accumulate. Chloramines, the most common cause of unpleasant odors, can be reduced by the action of free chlorine.

When trichlor is used 0.6 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 trichlor 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. Application methods will depend upon the product form (tablets, sticks or granules) being used and can range from broadcasting to skimmer feeding to the use of tablet feeders or floater feeders. 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 trichlor 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

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(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).

In white plaster pools, granular trichlor is often used to treat black algae that commonly grow in the cracks and crevices of the pool surfaces. Granular trichlor should not be used in vinyl-lined pools for this purpose because it dissolves very slowly. As a result, bleaching of the vinyl liner will occur.

## V. PRECAUTIONS

In order to safely use and handle trichlor 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.

Trichlor 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. Trichlor, 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, trichlor 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, trichlor 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.
3. ANSI/APSP-3, *Standard for Permanently Installed Residential Spas*, Association of Pool and Spa Professionals, 2111 Eisenhower Ave., Alexandria, Virginia 22314.
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