



**Trojan “06” Technology**

**&**

**d-limonenes**



## **TRL 06 Odour Control Concentrate**

### **Groundwash Product Series**

#### **Description:**

TRL 06 is an industrial odour control liquid formulated via a modified d-limonene extract. It is used primarily in waste water plants, rendering plants, sewage pits, farms, zoos, flooding restoration, garbage systems, dredging, etc. It may be sprayed or fed directly to waste water lagoons to allow molecular reaction with foul and obnoxious odours. It may be "dripped" in sewage treatment facilities to achieve the maximum residual effect. TRL 06 ODOUR CONTROL not only controls the noxious malodors but repels insects as well.

TRL 06 breaks down objectionable odours while imparting a high tone lemon peel odour. Being extremely concentrated, very small quantities are required for large areas, such as municipal sewage treatment plants, fertilized areas, rendered by-products. Having a light density and readily dilutable in water, it is easily fogged or sprayed over wide areas. It will not affect the bacterial action of sewage treatment plants, lagoons or ponds when used as directed.

#### **Used For:**

##### General Spray Use:

Add water to product in appropriate container to make solution for application as follows:

- spraying around rendering oven and plant in all interior and exterior areas of restaurants dairy, food, meat & fish plants in and around sewage treatment buildings basements after flooding use 1-1/2 ounces per gallon water

##### Agricultural Use:

- barns, cattle stalls, show pens zoos, compounds & other similar areas use approximately 10 ounces per gallon water.

##### Fogging Use:

- For electric atomizers, such as the Micro Mister or Dyna Fogger, use from 2 to 20 ounces per gallon of water, depending upon the need and "fog" into the atmosphere in and around tanneries and other areas where this type of treatment is deemed most suitable.

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Environmental Remediation

- As an adjunct to ex-situ pile groundwash, make a dilute aqueous solution of 1.0 to 10 % and spray over piles or injection feed.
- As an in-situ groundwash adjunct, TRL 06 may be added to the surfactant mix to control odours and increase solubilities..
- Consult with your Trojan representative for specific details.

Washing Use:

- For washing use, the product can be utilized in mop and bucket method of application for treating walls, floors, stalls, etc, to rid area of odors using

## **Technical Notes:**

### **Trojan Chemical's**

### **TRL 06 Odour Control Concentrate**

For many years it has been accepted that citrus oils are outstanding in their ability to modify and alter obnoxious odours. This is particularly true where the citrus oils have proven highly successful in the neutralizing of odours owing to mercaptans and sulfurous compounds. Experience dictates that there are many different mechanisms for modifying odours in air. These include oxidation, alkalization, absorption, antiseptis, washing action, chemical combination, electrostatic precipitation, catalysis and reodourization.

Any of these reactions do have a tendency to change the original product and as a result we have striven to have the deodorizing characteristics of the citrus oils modify, without entering into a chemical reaction with the offending product. In this manner, there are no basic chemical changes taking place, but rather a catalytic modification and perfuming with a superior citrus top note. Since this citrus oil is extracted from plant life to begin with, it has been found to be very safe when used as directed.

TRL 06 dilutes in water to form a milky white emulsion, and as a result it displays a tremendous ability to modify odours without changing the basic characteristics of the chemicals that it contacts. In all the years as use as an industrial odour control, TRL 06 acts safely and quickly without any side effects. It should be pointed out that in acting as a modifying agent, it does so by having approximately the same volatility as the odour bodies themselves and evaporation rates have been adjusted in this material by orientation and modifc m TD or

## **Dripping**

If we are dealing with large flowing volumes of odourous materials, such as in water pollution control plants, or in effluents (out flow) from industrial plants, such as dairies, paper mills, food plants, etc, TRL 06 is the most cost effective product that can be used. The most effective application of this product is via the "drip feed" method.

This drip feed method introduces the TRL 06 into the flow rates at the vicinity of 0.5 to 10 ppm (ie: parts per million). TRL 06 will not affect the healthy bacterial action necessary to proper sewage treatment. TRL 06 also has the ability to dissolve greases and slimes which trap and hold odourous materials.

TRL 06 Odour Control Concentrate should be used where its particularly pleasant fragrance and / or long term effectiveness will be of benefit and where a high degree of non toxic properties might be required, such as in food plant operations.

## **Cold Fogging**

If we want to aspirate or atomize or product solution into the air via cold fogging (misting) mechanism - either electric pump driven or air pump driven, so as to control air borne malodours.

TRL 06 Odour Control Concentrate would be used in a wide variety of dilutions to cold fog any malodourous conditions inside or outside, such as through exhaust stacks, around rendering operations, over lagoons or dump sites, in and around water pollution control plants, throughout and around food plants, public areas such as zoos, recreation facilities, exhibitions, parks barns, the odour controlling ability of the TRL 06 will aid in providing a more pleasant odour.

## **Thermal Fogging**

If we want to aspirate or atomize or product solution into the air via cold fogging (misting) mechanism - either electric pump driven or air pump driven, so as to control air borne malodours.

TRL 06 Odour Control Concentrate would be used in a wide variety of dilutions to cold fog any malodourous conditions inside or outside, such as through exhaust stacks, around rendering operations, over lagoons or dump sites, in and around water pollution control plants, throughout and around food plants, public areas such as zoos, recreation facilities, exhibitions, parks barns, the odour controlling ability of the TRL 06 will aid in providing a more pleasant odour.



## What are d-limonenes?

D-limonene is one of a naturally occurring class of chemicals (called monoterpenes) found in high concentrations in citrus fruits and to some extent in vegetables, meats, food items and plants. Because of its pleasant citrus fragrance, it is widely used as a flavor and fragrance additive in perfumes, soaps, foods, chewing gum and beverages. Monoterpenes are a sub-category of the terpene family.

The terpene family are essential oils, natural hydrocarbon compounds produced by plants from isoprene, that has its five carbon atoms arranged in a branched chain. Isoprenes combine to give many terpenes. Camphor and pinene are among the simple two-isoprene terpenes that help form the odor of pine. D-limonene is a specific terpene (monoterpene) found in citrus plants.

Because d-limonene is a relatively safe and highly effective organic solvent, it is finding increasing use in household and industrial cleaning products, replacing dangerous petroleum-based solvents and environmentally hazardous chlorinated hydrocarbon solvents. In fact, d-limonene-containing agents are being considered as substitutes for xylene reagents in scientific laboratories. Another application of d-limonene, especially the unrefined grades, has been as an odorant in sewage treatment plants. Additionally, the manufacture of d-limonene is ecologically sound since discarded citrus pulp and peels from the citrus juice industry are used as the source material for this versatile chemical.

### **Biodegradation/Environmental Fate**

It is well established that d-limonene, in man and in other species of mammals, is rapidly broken down by the liver. However, there is little available data on the natural biodegradation of d-limonene in the environment. Considering its natural origin, it is generally believed that d-limonene and related products are readily degraded. Indirect evidence for this belief can be found in publications by several investigators who have demonstrated the ability of certain types of bacteria (called Pseudomonads) to totally degrade limonene-like compounds. Other types of bacteria (i.e., Enterobacteria) are capable of transforming limonene into other by-products (e.g., dihydroperillic acid and perillic acid). Different species of microorganisms which are capable of metabolizing limonene into other by-products. D-limonene (and other monoterpenes) are easily degraded by microorganisms found in forest soil. *Bacillus stearothermophilus* can grow on and degrade d-limonene. In addition, several potentially valuable products have been based on the ability of microorganisms to breakdown d-limonene. For example, E. Bowen found that two varieties of common citrus mold easily convert d-limonene into other compounds with greater commercial value than native d-limonene. The USEPA has estimated the fate of terpenes in aqueous environments, using physical and chemical

properties generated by computer programs, AUTOCHEM, QSAR and Exams II. Due to their volatility, the half-life of terpenes in flowing water is expected to be about 1.2 hours and about 111 hours in lakes.

### **National Toxicology Program Study**

Since there is no concrete evidence demonstrating a relationship between d-limonene and cancer, the International Agency for Research on Cancer (IARC), in its evaluation of the carcinogenic risks of naturally occurring compounds, stated that d-limonene was not classifiable with respect to human carcinogenicity. Furthermore the mechanism of d-limonene tumor development does not appear to be possible in humans, since humans do not produce alpha-2T-globulin, and consequently it was concluded that d-limonene does not pose any carcinogenic or nephrotoxic (kidney toxicity) risk to humans.”

### **History:**

D-limonenes are not a new discovery. They were first used as cleaning agents and odour controls as long as 30 years ago. Trojan began using d-limonenes in odour control (TRL 06, TRL 107, etc) prior to 1960, and as cleaning/degreasing agents (TRL 606, 706 etc.) in the mid 1960's. Chlorinated solvents were the most widely used chemical cleaning agent over the past quarter century. Recently, concerns for occupational health and safety as well as the environment have reduced the use of these products. Some chlorinated solvents and all are toxic and ozone depleting. The search for alternate agents for cleaning has lead many to look at d-limonene as a substitute. With d-limonene's unique affinity for organic contaminants, such a petroleum greases and oils, they are now being selected as base ingredients to be formulated with other ingredients such as wetting agents, dispersants, penetrants, detergents etc., to manufacture finished products with a wide variety of unique characteristics.

### **d-Limonene structure**

