Fact Sheet Date: March 12, 1998

NEW YORK STATE
- HUMAN HEALTH FACT SHEET -

Ambient Water Quality Value for Protection of Sources of Potable Water

SUBSTANCE: 4-Chlorobenzotrifluoride **CAS REGISTRY NUMBER:** 98-56-6

AMBIENT WATER QUALITY VALUE: 5 ug/L

BASIS: Principal Organic Contaminant (Groundwater)
Principal Organic Contaminant Classes (Surface Water)

SUMMARY OF INFORMATION

Introduction

4-Chlorobenzotrifluoride (4-CBTF), a substituted halobenzene, is a clear, colorless liquid also known as p-chloro-a,a,a-trifluorotoluene (CTFT). It has a sweet pleasant odor, a molecular weight of 180.6, a vapor pressure of 8 mm Hg at 25^{o}C, and is moderately soluble in water (29 mg/L at 23^{o}C).[1,2] No information was found on taste and odor thresholds of 4-chlorobenzotrifluoride in water. The compound is used mainly as a starting material for the manufacture of the pre-emergent herbicide, trifluralin, and a small percentage is used in the synthesis of dyes and drugs.[3]

Pharmacokinetics

In rats administered a single dose of 4-CBTF (1 mg/kg) by gavage, approximately 80% of the dose was rapidly exhaled, unchanged. Another 2 to 3% was recovered, unchanged, in the feces. About 15% was metabolized and recovered in the urine mainly in the form of glucuronide metabolites. One per cent of the administered dose was retained in tissues (mainly in fat).[4]

Acute Toxicity

Data on the acute toxic effects of 4-CBTF on humans are limited. Contact of the eyes or skin with liquid 4-CBTF may cause irritation, and exposure to 4-CBTF vapors may cause irritation of the nose and throat.[2]

The oral LD_{50} and inhalation LC_{50} values reported in rats are 6.8 g/kg and 33 g/m^3, respectively.[3] Dose-related acute toxic effects resulting from inhalation exposure included partially-closed eyes, excessive lacrimation, redness around the eyes and labored breathing. Acute eye and primary skin irritation tests in rabbits indicate that 4-CBTF can irritate eyes or skin.[3]

Chronic Toxicity

In a 28-day subchronic study, rats were gavaged daily with 4-CBTF at doses of 0, 10, 100 or 1,000 mg/kg (six males and six females per dose group).[5] The effects observed were liver hypertrophy in both sexes dosed at 1,000 mg/kg/day and kidney damage in males given 100 or 1,000 mg/kg/day. Also observed was an increase in cholesterol and triglyceride levels in males at 100 or 1,000 mg/kg/day. Neither pathological nor biochemical changes were found at 10 mg/kg/day, which is reported as the no-observed-effect level (NOEL) in this study. A recent 14-day gavage study in rats and mice also reports no kidney toxicity at 10 mg/kg/day.[6]

In a 90-day subchronic study reported by the US EPA[3], rats were gavaged with 4-CBTF at doses of 0, 10, 40, 150 or 500 mg/kg/day (15 males and 15 female rats per dose group). Dose-related effects observed included elevated blood urea nitrogen, total bilirubin and alkaline phosphatase, increased liver and kidney weights and some kidney damage (tubular degeneration at high dose levels in males). The NOEL was estimated to be 10 mg/kg/day.[3]

Longer term studies to evaluate the chronic toxicity of 4-CBTF were not found.

Reproductive/Developmental Toxicity

No information was found.

Genotoxicity

4-CBTF showed no evidence of mutagenic activity in the following test systems either in the absence or presence of metabolic activation: (1) Ames test using Salmonella typhimurium, strains TA-1535, 1537, 1538, 98 or 100; (2) E. Coli W3110/$polA^+$ or P3478/$polA^-$; (3) Saccharomyces cerevisiae D_4; (4) mouse lymphoma forward in vitro mutation assay.[1,3] The frequency of chromosomal aberrations in vitro (with or without metabolic activation) was not affected by exposure of Chinese hamster ovary cells or rat bone marrow cells to 4-CBTF.[3]

In a cell transformation assay with BALB/3T3 cells with or without metabolic activation, none of the applied concentrations of 4-CBTF resulted in the induction of any transformed foci.[3]

Two in vitro test systems which did show induction of DNA damage by 4-CBTF were a sister chromosome exchange assay using mouse lymphoma cells with and without metabolic activation, and an assay for unscheduled DNA synthesis.[1,3]

Oncogenicity

Data on the oncogenic potential of 4-CBTF were not found.

Current Standards and Guidelines

Under the State Sanitary Code (10 NYCRR Part 5, Public Water Supplies), the New York State Department of Health has established a maximum contaminant level of 5 ug/L for "Principal Organic Contaminants" such as 4-CBTF in drinking water.[7]

DERIVATION OF VALUE

Groundwater

4-Chlorobenzotrifluoride is a principal organic contaminant with a maximum contaminant level of 5 ug/L under New York State Department of Health regulations as described above. The ambient groundwater standard for 4-chlorobenzotrifluoride is 5 ug/L because former groundwater regulations included 10 NYCRR Subpart 5-1 general standards by reference.

Surface Water

4-Chlorobenzotrifluoride belongs to one of the principal organic contaminant classes as defined in 6NYCRR 700.1. The most stringent value that can be derived for this substance using the procedures in 6NYCRR 702.3 through 702.7 is 5 ug/L, required under 702.3(b) for substances belonging to any principal organic contaminant class. Therefore, the ambient water quality value for 4-chlorobenzotrifluoride is 5 ug/L.

REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). 1982. Ninth report of the Interagency Testing Committee to the Administrator; Receipt of report and request for comments regarding priority list of chemicals. 4-Chlorobenzotrifluoride. Fed. Reg. 47: 5460-5462.

Occidental Chemical Material Safety Data Sheet (MSDS). November 20, 1987. Parachlorobenzotrifluoride. MSDS Number M7609.

U.S. Environmental Protection Agency (U.S. EPA). 1985. 4-Chlorobenzotrifluoride; Decision not to test. Fed. Reg. 50: 42216-42221.

Quistad, G.B. and K.M. Mulholland. 1983. Metabolism of p-Chlorobenzotrifluoride by rats. J. Agric. Food Chem. 31: 585-589.

Macri, A., C. Ricciardi, A.V. Stazi, A. Mantovani, C.V. Macri, A. Piccioni, E. Badellino and M.P. Bianchi. 1987. Subchronic oral toxicity of 4-chloro-α,α,α-trifluorotoluene in Sprague-Dawley rats. Fd. Chem. Toxic. 25: 781-786.

Private communication with Dr. C.W. Jameson, National Institute of Environmental Health Sciences, Research Triangle Park, NC 27709. Manuscript submitted for publication is entitled "Application of Molecular Encapsulation for Toxicology Studies III. Comparative Toxicity of p-Chloro-α,α,α-trifluorotoluene in α-Cyclodextrin Vehicle versus Corn Oil Vehicle - Male and Female 344/N Rats and B6C3F1 Mice.

10 NYCRR Part 5, Drinking Water Supplies (Statutory Authority: Public Health Law Section 225). Subpart 5-1. January, 1989. New York State Department of Health.

SEARCH STRATEGY

The following reference sources were reviewed:

1. Index Medicus, 1981 - Feb. 1991.

2. Chemical Abstracts, 1979-1988.

3. The following databases through 3/91: Toxline, Toxlit 65 and Toxlit, Chemline, and Hazardous Substances Data Bank (HSDB).

4. U.S. Environmental Protection Agency. 1991. Integrated Risk Information System (IRIS) Database. Washington, DC: Office of Health and Environmental Assessment. (March 1, 1991).

5. National Research Council. Drinking Water and Health, Volumes 1-9. Safe Drinking Water Committee, Board on Toxicology and Environmental Health Hazards,

Commission on Life Sciences. Washington, DC: National Academy Press.

6. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Volumes 1-47. Lyon, France: IARC.

New York State Department of Health
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