

1,3-Dichloropropane in Drinking-water

Background document for development of
WHO *Guidelines for Drinking-water Quality*

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Preface

One of the primary goals of WHO and its member states is that “all people, whatever their stage of development and their social and economic conditions, have the right to have access to an adequate supply of safe drinking water.” A major WHO function to achieve such goals is the responsibility “to propose regulations, and to make recommendations with respect to international health matters”

The first WHO document dealing specifically with public drinking-water quality was published in 1958 as International Standards for Drinking-Water. It was subsequently revised in 1963 and in 1971 under the same title. In 1984–1985, the first edition of the WHO Guidelines for drinking-water quality (GDWQ) was published in three volumes: Volume 1, Recommendations; Volume 2, Health criteria and other supporting information; and Volume 3, Surveillance and control of community supplies. Second editions of these volumes were published in 1993, 1996 and 1997, respectively. Addenda to Volumes 1 and 2 of the second edition were published in 1998, addressing selected chemicals. An addendum on microbiological aspects reviewing selected microorganisms was published in 2002.

The GDWQ are subject to a rolling revision process. Through this process, microbial, chemical and radiological aspects of drinking-water are subject to periodic review, and documentation related to aspects of protection and control of public drinking-water quality is accordingly prepared/updated.

Since the first edition of the GDWQ, WHO has published information on health criteria and other supporting information to the GDWQ, describing the approaches used in deriving guideline values and presenting critical reviews and evaluations of the effects on human health of the substances or contaminants examined in drinking-water.

For each chemical contaminant or substance considered, a lead institution prepared a health criteria document evaluating the risks for human health from exposure to the particular chemical in drinking-water. Institutions from Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Poland, Sweden, United Kingdom and United States of America prepared the requested health criteria documents.

Under the responsibility of the coordinators for a group of chemicals considered in the guidelines, the draft health criteria documents were submitted to a number of scientific institutions and selected experts for peer review. Comments were taken into consideration by the coordinators and authors before the documents were submitted for final evaluation by the experts meetings. A “final task force” meeting reviewed the health risk assessments and public and peer review comments and, where appropriate, decided upon guideline values. During preparation of the third edition of the GDWQ, it was decided to include a public review via the world wide web in the process of development of the health criteria documents.

During the preparation of health criteria documents and at experts meetings, careful consideration was given to information available in previous risk assessments carried out by the International Programme on Chemical Safety, in its Environmental Health

Criteria monographs and Concise International Chemical Assessment Documents, the International Agency for Research on Cancer, the joint FAO/WHO Meetings on Pesticide Residues, and the joint FAO/WHO Expert Committee on Food Additives (which evaluates contaminants such as lead, cadmium, nitrate and nitrite in addition to food additives).

Further up-to-date information on the GDWQ and the process of their development is available on the WHO internet site and in the current edition of the GDWQ.

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The WHO coordinators were as follows:

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GENERAL DESCRIPTION

Identity

CAS no.: 142-28-9

Molecular formula: C₃H₆Cl₂

Physicochemical properties (1) [Conversion factor in air: 1 ppm = 4.62 mg/m³]

<i>Property</i>	<i>Value</i>
Melting point	-99.5 °C
Boiling point	120.4 °C
Density	1.1876 g/cm ³ at 25 °C
Water solubility	2800 mg/litre at 25 °C

Major uses

1,3-Dichloropropane is used as an alkylating agent, ring-forming agent, and polymerization catalyst or promoter in the synthesis of organic chemicals (2). It may be found as a contaminant of soil fumigants containing 1,3-dichloropropene.

ANALYTICAL METHODS

1,3-Dichloropropane is determined by a purge-and-trap gas chromatographic procedure used for the determination of volatile organohalides in drinking-water (3). Mass spectrometry is used for confirmation; the detection limit is 0.10 µg/litre (4).

ENVIRONMENTAL LEVELS AND HUMAN EXPOSURE

Water

In the Ohio River and its tributaries, 1,3-dichloropropane was detected at levels below 0.8 µg/litre (2). No data on levels in drinking-water were found in the available literature.

EFFECTS ON LABORATORY ANIMALS AND *IN VITRO* TEST SYSTEMS

Acute exposure

An oral LD₅₀ of 3.0 g/kg of body weight for 1,3-dichloropropane was reported in dogs (5). An LD₅₀ of 3.6 g/kg of body weight was reported in mice for an unspecified route of exposure; the slight inflammation of the digestive tract noted suggests that it may have been oral (6).

Short-term exposure

1,3-Dichloropropane induced mild dermatitis on the shaved dorsal skin of mice. Peripheral blood changes, including an increased number of leukocytes and reticulocytes, were observed in dermally exposed animals (7).

Mutagenicity and related end-points

1,3-Dichloropropane was mutagenic in *Salmonella typhimurium* strain TA100 with and without metabolic activation at concentrations of 10 µmol per plate or more (8). It was also mutagenic in *S. typhimurium* strain TA1535 with but not without metabolic activation. The compound was not mutagenic with or without metabolic activation in *S. typhimurium* strains

TA98, TA100, TA1537, and TA1538; *Escherichia coli* strains WP₂ and WP₂ uvr A; or *Saccharomyces cerevisiae* strain JD_L (9).

CONCLUSIONS

There is some indication that 1,3-dichloropropane may be genotoxic in bacterial systems. However, no short-term, long-term, reproductive, or developmental toxicity data pertinent to exposure via drinking-water could be located for this compound. The available data were considered to be insufficient to permit recommendation of a guideline value.

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