Sources of Exposure

General Populations

- The principal source of human exposure to bromoform and dibromochloromethane is chlorinated water supplied to homes, work, and public places.
- The general population is primarily exposed to bromoform or dibromochloromethane through ingestion of chlorinated tap water.
- Some bromoform and dibromochloromethane will volatilize into the air from normal household use of water. Thus, bathing and showering may result in significant inhalation and dermal exposure.
- The general population may also be exposed to bromoform and dibromochloromethane during swimming in chlorinated pools.

Occupational Populations

- There are limited occupational uses for bromoform and dibromochloromethane.
- Individuals who work at indoor pool facilities may be at more risk of exposure than the general population.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Bromoform and dibromochloromethane are readily absorbed from the gastrointestinal tract, and are likely well absorbed through the respiratory tract and skin.
- In the liver, bromoform and dibromochloromethane are metabolized by cytochrome P-450 enzymes into carbon dioxide or carbon monoxide.
- Bromoform and dibromchloromethane are rapidly eliminated from the body almost exclusively via exhalation in either the unmetabolized form or as carbon dioxide.

Normal Human Levels

- In a national survey, bromoform and dibromochloromethane were infrequently detected (<15%) in blood samples; the maximum concentrations were 0.034 µg/L for bromoform and 0.024 µg/L for dibromochloromethane.

Biomarkers/Environmental Levels

Biomarkers

- Both compounds can be found in the blood and expired air; however, quantification of exposure is difficult because these compounds are rapidly cleared from the body.

Environmental Levels

Air

- Infrequently found in air samples, and only at biologically irrelevant levels.

Sediment and Soil

- Rarely detected in sediment and soil samples.

Water

- Both compounds are rarely detected in nonchlorinated water samples. In chlorinated water samples, studies have reported mean concentrations ranging from 0.1–12 µg/L for bromoform and 1–28 µg/L for dibromochloromethane.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Bromoform and Dibromochloromethane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

$CHBr_3$ and $CHBr_2Cl$

ToxGuide™ for Bromoform and Dibromochloromethane

$CHBr_3$ and $CHBr_2Cl$

CAS# 75-25-2 and 124-48-1

April 2005

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Bromoform and dibromochloromethane are liquids

- Bromoform and dibromochloromethane are colorless to yellow heavy, nonburnable liquids with a sweet odor. They are typically found dissolved in water or as airborne vapors.
- These chemicals are possible contaminants of chlorinated drinking water. They may also form when chlorine reacts with decomposing plant material in water.
- Bromoform is only produced in small amounts for use in laboratories and in geological and electronics testing.
- Dibromochloromethane is only used on a small scale in laboratories at present.

Routes of Exposure

- Inhalation – Significant route of exposure for general population from volatilized compounds.
- Oral – Predominant route of exposure for the general population through ingestion of chlorinated tap water.
- Dermal – Significant route of exposure for general population through bathing, showering, and possibly swimming in chlorinated pools. Can be a major route during occupational exposures.

Bromoform and Dibromochloromethane in the Environment

- Bromoform and dibromochloromethane enter the environment through the disposal of chlorinated water or as vapors emitted from chlorinated water.
- Bromoform and dibromochloromethane are broken down much slower in surface water than in deep or underground water.
- Bacteria in water and soil may break down these compounds, but the speed at which they do so in unknown.
- Bromoform and dibromochloromethane are mobile in soil and may seep into groundwater.
- Bioconcentration in fish does not appear to occur.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No inhalation MRLs were derived for bromoform or dibromochloromethane.

Oral

- An MRL of 0.7 mg/kg/day was derived for acute-duration oral exposure to bromoform (≤14 days).
- An MRL of 0.2 mg/kg/day was derived for intermediate-duration oral exposure to bromoform (15–364 days).
- An MRL of 0.02 mg/kg/day was derived for chronic-duration oral exposure to bromoform (≥1 year).
- An MRL of 0.1 mg/kg/day was derived for acute-duration oral exposure to dibromochloromethane (≤14 days).
- No intermediate-duration oral MRL was derived for dibromochloromethane (15–364 days).
- An MRL of 0.09 mg/kg/day was derived for chronic-duration oral exposure to dibromochloromethane (≥1 year).

Health Effects

- The main effect of swallowing or breathing large amounts of bromoform is a transient slowing of normal brain activities, resulting in sleepiness or sedation.
- Exposure to high doses of bromoform or dibromochloremethane can result in liver and kidney injury within a short time.
- Oral exposure to high levels of bromoform or dibromochloromethane can result in accumulation of fat in the liver, serum chemistry changes, and focal hepatocellular necrosis. Renal effects have been observed following exposure of lab animals to dibromochloromethane.
- Exposure to low levels of bromoform or dibromochloremethane do not appear to seriously affect brain, liver, or kidneys.
- Death has been reported in humans after accidental overdose of bromoform when used as a sedative. Toxic effects included severe central nervous system depression and respiratory failure.
- In animal studies, oral exposure to very high doses of both compounds resulted in labored breathing and death due to central nervous system depression.

Children's Health

- It is not known if children are more susceptible to bromoform or dibromochloromethane poisoning than adults.