



# fact sheet

## Bromate in Drinking Water Information for Consumers

### Questions and Answers

#### Q. What is bromate?

**A.** Bromate ( $\text{BrO}_3^-$ ) is composed of the element bromine plus oxygen. In drinking water, it can form as an unintentional byproduct when water disinfectants, usually ozone and sometimes chlorine, react with bromide ( $\text{Br}^-$ ) in the water. Bromide occurs naturally in many waters but can also come from certain types of pollution.

The level of bromate in drinking water depends on the amount of bromide that is present in the water and the amount of disinfectant needed to ensure water safety. Water systems can sometimes experience temporary increases in bromate due to short-term increases in disinfectants which can be needed when there is a water main break, water systems are under repair, or there is a potential microbial (example: bacteria) problem.

Community and non-transient non-community (NTNC) public water systems that use ozone to disinfect the water are required by federal and state law to sample monthly for bromate at the entry point to the distribution system, at each treatment plant in the system unless criteria are met for reduced (quarterly) monitoring.

#### Q. Why are disinfectants added?

**A.** Disinfection of water supplies is necessary to prevent illness. This practice has nearly eliminated most waterborne diseases in the United States. Reducing the levels of bromate and other disinfection byproducts while maintaining effective disinfection of the water is challenging and may require several process and treatment modifications that take time to install and get working effectively. Stopping disinfection is not an option as the risk of illness from drinking untreated water is typically greater than the risks from the byproducts.

In addition to disinfecting the water, ozone can also be effective in aiding in the removal of metals such as iron and manganese, as well as other compounds in water including those that are responsible for taste, odor, and color issues.

#### Q. What is the drinking water standard for bromate and how do we tell if it is being met?

Massachusetts Department of  
Environmental Protection  
100 Cambridge Street, Suite 900  
Boston, MA 02114

Commonwealth of  
Massachusetts  
Maura T. Healey, Governor  
Kimberley Driscoll, Lt. Governor

Executive Office of  
Environmental Affairs  
Rebecca L. Tepper, Secretary

Department of  
Environmental Protection  
Bonnie Heiple, Commissioner

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This information is available in  
alternate format. Contact Melixza  
Esenyie at 617-626-1282  
TTY# MassRelay Service  
800-439-2370

MassDEP Website:  
<https://www.mass.gov>

ADA Coordinator at  
617-556-1057.



**A.** Drinking water standards are called maximum contaminant levels (MCLs). The bromate MCL is set at a level to protect against the long-term risk of potential non-cancer and cancer health effects and to limit the possibility of bacterial contamination.

The US EPA and MassDEP have set an MCL for bromate of 10 ug/L (also referred to as parts per billion (ppb))<sup>1</sup> calculated as a Running Annual Average (RAA). Results are averaged each calendar quarter to determine compliance with the MCL.

**Q. How can consumers be exposed to bromate in drinking water?**

**A.** Drinking water is the main source of exposure to bromate, followed by foods and/or ice prepared with the water. Bromate does not readily vaporize to the air and very little of it penetrates the skin, so exposure to bromate by inhalation or skin absorption during handwashing, bathing, or showering is negligible.

Bromate is also found in some consumer products. Bromate is used in some neutralizer solutions for home hair permanent wave cosmetic products. It is also added to some flour in the baking industry to improve the texture of baked goods. Though this use is legal in the U.S., it has been discontinued in Brazil, Canada, the European Union, and the United Kingdom.

**Q. What are the health risks associated with using water containing bromate?**

**A.** Based upon evidence of carcinogenicity in multiple studies in laboratory animals, and evidence of genotoxicity, the U.S. EPA has determined that exposure to bromate in drinking water is likely to be carcinogenic to people. People exposed to very high concentrations of bromate in accidental poisoning incidents, as well as laboratory animals exposed to high concentrations of bromate have exhibited effects on the nervous system, especially hearing loss. However, no studies of longer-term exposures to bromate at lower levels of exposure associated with drinking water have studied this effect in either humans or animals.

Other effects that have been reported in experimental animals exposed to high levels of bromate include effects on the kidneys, reduced ability of blood to transport oxygen, and a decreased sperm count in males that was not associated with a reduction in fertility. These effects were observed at exposure levels much higher than levels associated with drinking water.

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<sup>1</sup>  $\mu\text{g/L} = \text{mg/L} / 1000$



Because bromate can cause adverse health effects in kidneys, it is possible that those with pre-existing kidney conditions could be at greater risk if levels in drinking water are significantly higher than the MCL.

There is no indication from available studies on bromate that children or pregnant women and their developing fetuses are more sensitive to effects of bromate than adults. However, children (including infants) are generally considered more sensitive to the effects of chemicals than others in the general population and typically also consume more water for their size than adults.<sup>2</sup>

The degree of risk for these health effects will depend on the bromate level and the duration of exposure. Though the toxicity information on long-term effects of bromate is limited, consumption of water with bromate levels somewhat above the MCL for limited durations, for example, while corrective actions are being taken to lower the levels, is not likely to significantly increase risks of adverse health effects for most people.

**Q. What should mothers who are breastfeeding infants know?**

**A.** It is not known whether breast milk is a source of bromate exposure for infants, however, the Centers for Disease Control and Prevention recommend that nursing mothers continue to breastfeed their babies because of the numerous protective health benefits.

**Q. If you are concerned and would like to reduce your exposure to bromate, what can you do?**

**A.** Anyone who is concerned with exposure can limit consuming water containing bromate that exceeds the MCL. An effective way to reduce exposures is to use bottled water for drinking and for preparing formula, beverages, or food that retains water (e.g., hot cereals, rice, or pasta). Bottled water sold in Massachusetts must meet all federal drinking water quality standards and, if originating in Massachusetts, must also meet state drinking water quality requirements.

Another option for reducing exposure to bromate in drinking water is to use a home filter. Although there are no treatment devices that have been certified for residential bromate removal, use of drinking water treatment devices that have been certified to meet NSF/ANSI Standard 58 (Reverse Osmosis Drinking Water Treatment Systems), NSF/ANSI Standard 62 (Drinking Water Distillation Systems), or NSF/ANSI Standard 53 (Drinking Water Treatment Units – Health Effects) may be somewhat effective at removing bromate. However, water that has been treated using reverse osmosis or distillation may

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<sup>2</sup> [Exposure to Chemicals in Drinking Water by Infants and Children Fact Sheet \(mass.gov\)](https://www.mass.gov/info-details/exposure-to-chemicals-in-drinking-water-by-infants-and-children-fact-sheet)



be corrosive to your home's internal plumbing, plus both of these processes require larger quantities of water in order to obtain the required quantity of treated water. Therefore, these devices should be installed preferentially at the drinking water point of use, such as at a kitchen sink tap.

For consumers who choose to use a home treatment device, it is very important to follow the operation and maintenance specifications carefully to make sure that the device works as intended. For additional general information on home water treatment devices, please refer to:

<https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water-treatment>

**Q. Where can I get additional information?**

**A.** If you have questions about your water system's operation, water quality monitoring, or water quality, please contact the system operator directly. For contact information for all public water suppliers see <https://www.mass.gov/water-supplier-operations> and scroll down to the Reporting & Public Notification section. If you have questions about the drinking water regulations or health risks posed by these contaminants<sup>3</sup>, you can contact the MassDEP Drinking Water Program at: [program.director-dwp@mass.gov](mailto:program.director-dwp@mass.gov). If you have questions about specific health symptoms, you can contact your doctor or other health care provider. If you have general questions about bromate and your health, you can contact the Massachusetts Department of Public Health at 617-624-5757.

Statewide water quality results for most drinking water contaminants in public water supplies, including bromate, can be searched at:

Energy & Environmental Affairs Data Portal.

<https://eeaonline.eea.state.ma.us/Portal/#!/search/drinking-water>

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<sup>3</sup> [Drinking Water Standards and Guidelines | Mass.gov](#)