

wellcare[®] information for you about Chlorine Disinfectants & Their Byproducts

What are Chlorine Disinfectants and Disinfectant Byproducts?

Chlorine-based disinfectants are used to kill harmful bacteria and parasites, such as *E. coli* and *giardia lamblia*, in drinking water. The common components are chlorine, chloramines or chlorine dioxide.

Disinfectant byproducts are the chemicals created when chlorine left over from water treatment reacts with organic matter, which naturally exists in drinking water, to form a third substance. The most common byproduct is total trihalomethanes. Others include bromate, chlorite and haloacetic acids.

Chlorine disinfectants are used routinely by more than 98 percent of public water systems to protect their customers from waterborne diseases. The treatment dates back nearly 100 years.

While only a small percentage of individual wells test positive for bacteria and viruses each year, those that do will likely turn to chlorine disinfectants to treat their water. If chlorine remains in the well, it could react with organic matter to create byproducts.

The amount depends on a number of things, including the season. For example, total trihalomethanes levels are generally lower in winter than in summer, because the amount of natural organic matter is lower and less chlorine is needed to disinfect water at colder temperatures.

What are the health effects of Chlorine Disinfectants and Disinfectant Byproducts?

The EPA has outlined both the health effects and the maximum allowed levels of chlorine disinfectants and their byproducts in public water supplies. The limits listed below are also a good guide for well owners.

Disinfectants

- **Chlorine:** Can cause eye and nose irritation and stomach discomfort. Limit to four parts per million.
- **Chloramines:** Can cause eye and nose irritation, stomach discomfort and anemia. Limit to four parts per million.
- **Chlorine dioxide:** Can cause anemia, nervous system problems in infants and young children and similar effects on fetuses during pregnancy. Limit to 0.8 parts per million (same as 800 parts per billion).

Disinfectant Byproducts

- **Total Trihalomethanes:** Can cause liver, kidney or central nervous system problems, can increase the risk of cancer. Limit to 80 parts per billion.
- **Bromate:** Can increase the risk of cancer. Limit to 10 parts per billion.
- **Chlorite:** Can cause anemia, nervous system problems for infants and young children and similar effects on fetuses during pregnancy. Limit to one part per million.
- **Haloacetic Acids:** Can increase the risk of cancer. Limit to 60 parts per billion.

How do I test for these?

While all well owners should test their well water for bacteria every year, only those who are treating their water with chlorine need to worry about disinfection and disinfection byproducts. Contact your state or local health department for a list of laboratories certified to test for chlorine and total trihalomethanes.

What are the treatments for Disinfectants and Disinfectant Byproducts in drinking water?

Consider using another disinfection product, other than chlorine, to treat bacterial contamination in your drinking water. Other options include ultra-violet light and ozone-based systems.

Another option is to treat the water before it is disinfected, to remove the organic matter that reacts with chlorine, through systems called enhanced coagulation or enhanced softening. Or you can treat the water after disinfection, using activated carbon filters that remove chlorine and its byproducts.

However, if your drinking water is persistently plagued by bacterial contamination that requires such treatments, consider drilling a new well

For more information about Disinfectants and Disinfectant Byproducts

U.S. Environmental Protection Agency (EPA). Drinking Water Contaminants. Retrieved on May 25, 2007 from www.epa.gov/safewater/contaminants/index.html

For more information on your drinking water

Contact your local water well professional or health department for information on ground water in your area. The following websites provide up-to-date information on efforts to protect drinking water supplies and steps you can take as a private well owner. In addition, you may contact the **wellcare®** hotline at 1-888-395-1033.

Underwriters Laboratories Inc. Drink Well™ Well Water Testing
U.S. Environmental Protection Agency
Water Quality Association

www.uldrinkwell.com
www.epa.gov
www.wqa.org

For more information about wells and other wellcare® publications

wellcare® is a program of the **Water Systems Council (WSC)**. WSC is a national nonprofit organization dedicated to promoting the wider use of wells as modern and affordable safe drinking water systems and to protecting ground water resources nationwide. This publication is one in a series of **wellcare®** information sheets. There were more than 60 available at the time this document was published. They can be downloaded FREE from the WSC website at www.watersystemscouncil.org. Well owners and others with questions about wells or ground water can also contact the **wellcare®** hotline at 1-888-395-1033 or visit www.wellcarehotline.org



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