

# wellcare<sup>®</sup> information for you about Chlorine Disinfectants & Their Byproducts

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## What are Chlorine Disinfectants and Disinfectant Byproducts?

These disinfectants use chlorine-based chemicals to kill harmful bacteria and viruses, 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 (THM). 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, THM 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, 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 threaten child development 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 and nervous system problems for infants and young children. 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 worry about disinfection and disinfection byproducts. Contact your state or local health department for a list of laboratories certified to test for chlorine and THM.

## What is the Treatment 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.

Or you can 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

EPA Office of Ground Water & Drinking Water: [www.epa.gov/safewater/hfacts.html](http://www.epa.gov/safewater/hfacts.html)

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## For more information on your drinking water

The following sites provide up-to-date information on efforts to protect drinking water supplies and steps you can take as a private well owner:

Water Quality Association      [www.wqa.org](http://www.wqa.org)  
NSF International                [www.nsf.org](http://www.nsf.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. Well owners and others with questions about wells or well water can now call the wellcare® hotline at **888-395-1033** or visit [www.watersystemscouncil.org](http://www.watersystemscouncil.org)



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