

Corrosive Water – Facts, Common Questions, and Resources
Ryan P. Gordon, Maine Geological Survey
August 2016

What is corrosive water?

Corrosivity is a property of water. Most metals deteriorate with time when in contact with any water. However, corrosive water is more likely than non-corrosive water to corrode (destroy or “gnaw”) metal. Corrosion happens because of chemical reactions that occur when the water and metal are in contact, such as in a pipe. Rusted iron is the most well-known form of corrosion, but it can also occur with copper, lead, aluminum, zinc, and many other common metals.

No single dissolved substance is responsible for making water corrosive, but several factors can increase the likelihood of corrosion, including softness (a lack of dissolved calcium and magnesium), conductivity (high concentrations of ions), dissolved oxygen, acidity (low pH), and high temperature (such as in water heaters and hot-water pipes).

Can corrosive water be a problem?

Despite sounding somewhat scary, corrosive water that is otherwise uncontaminated is not unhealthy to drink. The problems with corrosive water occur when it reacts with pipes, solder, valves, or fixtures in people’s homes. The corrosion of household plumbing can leach toxic metals like lead and copper from the plumbing and into the drinking water. Lead exposure is especially dangerous for children and pregnant women, but can affect the health of all people (1). Other problems can include leaking plumbing, greenish stains in fixtures, and unpleasant tastes.

Typically, public water systems monitor their water for corrosivity and other quality concerns and correct them with treatment before sending water through the distribution system. As a result, most problems due to corrosive water occur in houses that supply their own water, typically through private drilled or dug wells. However, even homes that use public water can have dissolved lead in the water if the plumbing includes old lead pipes, lead solder, or leaded brass fixtures (more common in homes built before 1986).

Where is corrosive water found?

Water that is naturally corrosive can be found in all fifty of the United States, in surface water as well as groundwater. Because most households that supply their own water use wells to access groundwater, corrosive groundwater has received the most attention. In some states and regions, including Maine, there is a higher likelihood of finding corrosive groundwater than in others (2).

Groundwater in Maine is often soft, which means that it is low in dissolved calcium and magnesium. If present in significant amounts, these minerals can prevent corrosion by coating the inside of pipes with a physical scale of solid material (primarily the mineral calcite, CaCO₃). The soft water in Maine is primarily due to the relative lack of calcium and magnesium in the bedrock in most of the state, with the exception of some areas of eastern Aroostook County that are underlain by limestone. It must be pointed out that groundwater has the potential to be corrosive at any location in the State of Maine, so testing well water is the only way to be sure.

Why should I test my water?

It is possible, and relatively easy, to test your water for corrosivity factors, as well as dissolved lead and copper that could be in the drinking water due to corrosion of plumbing or fixtures. If you get your water from a private well, the Maine Center for Disease Control and Prevention (MeCDC) recommends that you test your water once per year for bacteria and nitrates and every 3 to 5 years for arsenic, fluoride, uranium, radon, lead, and manganese. Any of these contaminants can be found in drinking water in any part of Maine. Tests may also be done for copper and for several measures of corrosivity. More information about testing methods and a list of laboratories can be found at the following MeCDC website:

<http://www.maine.gov/dhhs/mecdc/environmental-health/eohp/wells/mewellwater.htm>.

What can I do about corrosive water?

If you suspect that your drinking water is corrosive, than you should test your water for lead, and determine if your home could have lead in the pipes, solder, or fixtures (built before 1986). The longer that water sits in your home plumbing, the more likely it is to contain dissolved metals. It is therefore recommended to flush the plumbing by running the water for several minutes before using it for drinking, making food, or mixing baby formula. Never use hot or warm tap water for human consumption. It also may be necessary to filter or treat the water, but any treatment system should be designed by a professional based on the results of an appropriate water test. More information about treatment options and methods to reduce lead in drinking water can be found through the MeCDC and US EPA websites below.

Other Resources

More information about corrosive water: <http://extension.psu.edu/natural-resources/water/drinking-water/water-testing/pollutants/corrosive-water-problems>

Maine Center for Disease Control and Prevention (MeCDC):

<http://www.maine.gov/dhhs/mecdc/environmental-health/eohp/wells/index.htm>

US Environmental Protection Agency (EPA): <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water>

Notes

1. <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#health>
2. http://water.usgs.gov/nawqa/pubs/gw_corrosivity/