



# The drop on water pH and Alkalinity

The pH level of your drinking water is a measure of how acidic or basic it is – pH is related to the hydrogen ions in water and stands for “potential of hydrogen.”

Alkalinity is a measure of the capacity of water to neutralize acids. It measures the presence of carbon dioxide, bicarbonate, carbonate, and hydroxide ions that are naturally present in water. At normal drinking water pH levels, bicarbonate, and carbonate are the main contributors to alkalinity.

## Sources

The pH and alkalinity of well water can be affected by

- natural geologic conditions at the site
- acid rain
- coal or other mining operations
- landfill, factory, gas station, or dry-cleaning operations
- water treatment processes

## Aesthetic Objective for Drinking Water

### pH

pH is measured on a scale from 0 to 14:

- A measurement below 7 means the water is acidic.
- A measurement above 7 means the water is basic, or alkaline.
- A measurement of 7 is neutral.

The Canadian drinking water quality guideline for pH is an Aesthetic Objective (AO) of **between 6.5 and 8.5**.

## QUICK FACTS

- pH is a measure of how acidic or basic water is.
- Alkalinity is a measure of the buffering capacity of water – its ability to resist sudden changes in pH.
- pH and alkalinity can be measured through testing at an accredited lab.
- The Canadian drinking water quality guideline for **pH** is an Aesthetic Objective (AO) of **between 6.5 and 8.5**.
- There is currently no numerical Canadian drinking water quality guideline for alkalinity
- Water with a pH less than 6.5 may contribute to the corrosion of metal pipes and release metals, such as lead and cadmium, into drinking water.
- Water with a pH greater than 8.5 may contribute to scale build-up in plumbing.
- To improve the aesthetic quality of drinking water, homeowners may consider water treatment options or use an alternative water source.

# pH and Alkalinity

## Alkalinity

Alkalinity measures the concentrations of bicarbonate, carbonate, and hydroxide ions and is expressed as an equivalent concentration of calcium carbonate ( $\text{CaCO}_3$ ).

No numerical Canadian drinking water quality guideline currently exists for alkalinity.

## pH and Alkalinity in Drinking Water

A pH less than 6.5 may contribute to the corrosion of pipes and fixtures. How corrosive the water is also depends on other factors, such as alkalinity, water temperature, total dissolved solids, and hardness. See our fact sheet on hard water for more information.

A pH less than 6.5 is not a health-risk in itself; however, corrosive water can dissolve metals, such as lead, cadmium, zinc, and copper, present in pipes. This may lead to increased concentrations of these metals in drinking water, which can cause health concerns (see our fact sheets on lead, cadmium, zinc, and copper for more information).

A pH greater than 8.5 may contribute to scale build-up in plumbing.

Figure 1 shows the relationship between pH and alkalinity and how they are factors in determining whether water is corrosive, scale-forming, or neutral.

## Testing

Regularly test your well water for a standard suite of chemical parameters, including pH and alkalinity. Use an accredited water testing laboratory. Find a list of accredited water testing laboratories at [www.gov.ns.ca/nse/water/waterlabs.asp](http://www.gov.ns.ca/nse/water/waterlabs.asp) or see the Yellow Pages under “laboratories.”

Get the special sampling bottles and instructions on proper sampling from the laboratory.

The cost of analyzing water samples can range from \$15 for a single parameter to \$230 for a full suite of chemical parameters. The cost can vary depending on the lab and the number of parameters being tested.

## REGULAR TESTING

Homeowners are responsible for monitoring the quality of their well water:

- Test for bacterial quality every 6 months.
- Test for chemical quality every 2 years.
- Test more often if you notice changes in physical qualities – taste, smell, or colour.

Regular testing alerts you to problems with your drinking water.

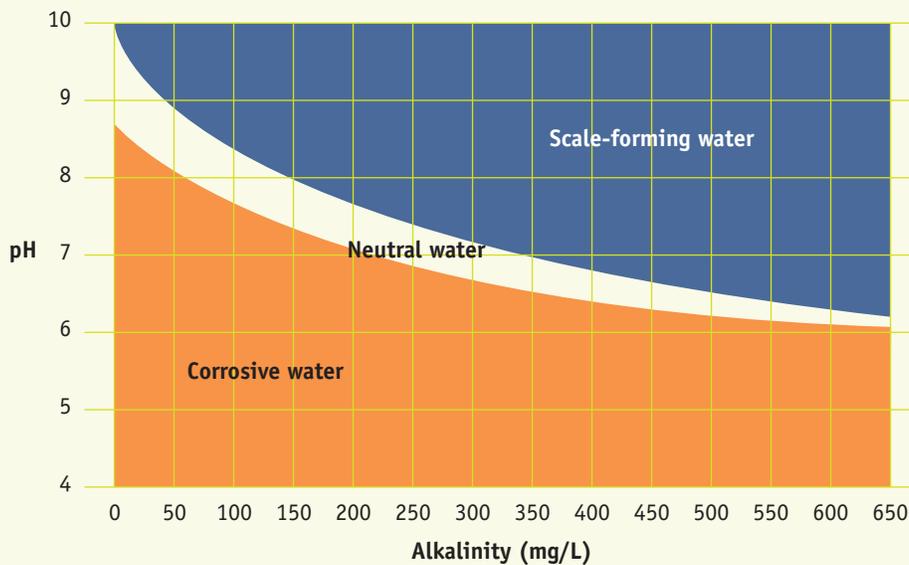


### Solutions

If a pH less than 6.5 is confirmed in the well water, your water may be corrosive. If a pH greater than 8.5 is confirmed in the well water, your water may be scale-forming and contribute to incrustation.

Although a pH less than 6.5 does not pose serious health risks, it may contribute to the corrosion of plumbing materials and the release of metals into the water, such as lead, cadmium, zinc, or copper. Get a metal scan done at an accredited water testing laboratory, because the presence of such metals in drinking water may pose health risks.

**Figure 1**  
The relationship between pH, alkalinity, and water stability



# pH and Alkalinity

## Treatment Systems

One of the main purposes of adjusting pH is to minimize corrosion and incrustation in the water supply system. Both corrosion and incrustation can damage the water supply system.

We recommend purchasing a treatment system that has been certified to meet the current NSF standards. NSF certification is an internationally recognized safety standard. NSF International is a not-for-profit, non-governmental organization that sets health and safety standards for manufacturers in 80 countries. See its website at [www.nsf.org](http://www.nsf.org).

Although, there are currently no units certified specifically for pH adjustments, several treatment options can adjust pH to the optimum range of between 6.5 and 8.5:

- acid neutralizing filters
- ion exchange units
- chemical feed pump systems with a neutralizing solution

When choosing a treatment system to minimize corrosion, you should consider both the pH and alkalinity of water, since alkalinity is a measure of the buffering capacity of water – its ability to resist sudden changes in pH.

Once installed, re-test your water to ensure the treatment system is working properly. Maintain the system according to the manufacturer's instructions to ensure a continued supply of safe drinking water.

## Considerations

Acid neutralizing filters, which use natural minerals, such as calcite, typically only raise pH by 1 to 2 units. They are not as effective in raising pH when water contains excessive levels of total dissolved solids. Advantages of these filters include low operation and maintenance costs. These filters may also increase hardness. See our fact sheet on hardness for more information.

Chemical feed treatment systems require very careful operation and maintenance. If soda ash is used as the neutralizing solution with a chemical feed pump, the sodium content of the water may increase. This may be a concern for those following a sodium-restricted diet. See our fact sheet on sodium for more information.

## FOR MORE INFORMATION

Contact

Nova Scotia Environment at  
1-877-9ENVIRO  
or 1-877-936-8476

[www.gov.ns.ca/nse/water/](http://www.gov.ns.ca/nse/water/)

  
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