ADVANCED WATER SYSTEMS GROUP

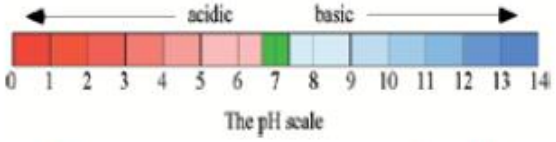
Proudly Presents

Frequently Asked Questions (FAQs) About Residential Water Quality

Why is pH important?

The pH of water

refers to a measure of the acidity of the water. The pH scale is a logarithmic scale ranging from 0 to 14, where a pH of 7.0 is considered to be neutral. Technically, the scale is the negative logarithm of the hydrogen ion [H^+] concentration in the water. This is often referred to as "Potential Hydrogen". Any water with a pH lower than 7.0 is said to be "acidic" and water above 7.0 is called "basic", as shown in the pH scale below.



The pH scale

Most natural rainwater is acidic in nature with pH levels often approaching 5.0-6.0. This is because rainwater is very low in dissolved solids, and the nearly pure H_2O reacts easily with CO_2 in the air to form carbonic acid (H_2CO_3). As rainwater enters the groundwater system it dissolves minerals from the soils and rocks, adding hardness and raising the pH.

The primary problem with acidic or corrosive water is that it tends to dissolve metal components in plumbing systems and water-using appliances. Homes with copper plumbing and metal fixtures are especially susceptible to this problem. The most common sign of low pH is blue-green staining on porcelain bathroom fixtures, showers or in toilet bowls, or a metallic taste to the water (see Figure 1). These stains indicate the presence dissolved copper in the water, which has precipitated out as copper salts, which are greenish. They also mean that copper metal is being stripped from your pipes, impacting their strength and integrity.

The overall cost of corrosion can be expensive, both in dollars and potential impacts on your family's health. The major issues with acidic water are shown in the blue box.

The following are the recommended maximum contaminant levels for regulated public water supplies for several common metals: chromium (0.05 PPM), copper (1 PPM), lead (0.05 PPM), and zinc (5 PPM). To protect the public the EPA requires public water supplies to be non-corrosive and the "Lead and Copper Rule" has set new action levels for lead and copper of 0.015 PPM and 1.3 PPM, respectively. In addition, the EPA has established a recommend maximum contaminant level of 0 PPM for lead, because of the concern with the toxicity of lead in children.

Figure 1. Blue-green stains in a toilet due to copper corrosion by acidic water.

To prevent corrosion of plumbing systems, the EPA recommends that potable drinking water supplies have a pH between 6.5 and 8.5. If a public water supply is corrosive, the state generally requires that the water be treated to make the water non-corrosive.

PROBLEMS FROM ACIDIC WATER

- Decreased lifespan of water heaters due to possible premature failure and tank leakage.
- Corrosion and premature failure of household plumbing and plumbing fixtures.
- Imparts a bitter or sour taste to your water because of elevated levels of metals
- Results in the formation of hard to remove blue-green stains on drains and porcelain fixtures.
- Consumption of water with elevated levels of toxic metals, such as lead, copper, chromium and zinc have been shown to cause both acute and chronic health problems.
- Water has potential to dissolve harmful metals and other contaminants from groundwater system (aquifer).

ADVANCED WATER SYSTEMS GROUP

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Why is pH important?

Treatment for low pH

Most low pH problems can be corrected by a process called "Acid Neutralization". This is similar to taking Tums® when you have acid indigestion. To raise the pH of the water we mimic Mother Nature by adding minerals to the water to buffer the pH.

For residential applications, there are two primary methods for raising pH using carbonate minerals.

Option 1: *Calcium Carbonate (calcite) ($CaCO_3$).*

The **Kinetico Acid Neutralizer** utilizes a single large tank filled with fine, granular calcite. As the water passes through the calcite bed from the bottom up, the carbonate slowly dissolves in the acidic water raising the pH to values near 7.0. As the calcite dissolves away, eventually the tank has to be re-bedded with new minerals. The time for this to happen depends upon the pH of the water and the water usage.

The dissolution of calcite also causes the hardness of the water to be increased significantly, since Ca is being added to the water. If the water has natural hardness requiring a water softener, then using calcite to raise pH is the best choice since the softener is needed anyway. The pros and cons of using calcite acid neutralizers are listed below.

PROS OF CALCITE NEUTRALIZATION

- Less expensive that alternative methods
- Simple maintenance - usually once per year
- Non-electric (Upflow only)
- Has minimal footprint

CONS OF CALCITE NEUTRALIZATION

- Increases hardness of water
- Limited pH control (cannot tune system)
- Requires addition of water softener
- Requires post-filter for calcite fines

Option 2: *Sodium Carbonate (soda ash) (Na_2CO_3).*

Another way to get carbonate into the water is to use sodium carbonate, called soda ash. Soda ash is a fine powder and must be mixed up into a liquid solution and injected into the water stream.

We recommend the Stenner ECON FP compact soda ash injection system. The system has several components:

- Sensing water meter to signal injection pump
- 35-gallon solution drum
- Stenner ECON FP peristaltic pump system (panel-mounted) with flow-cube
- Injection point (panel-mounted)
- Blending tank for homogenization

Unlike the calcite system, the water hardness is not changed using this method. If there is no natural hardness, iron or manganese then this would be a good choice. The pros and cons of the soda ash system are given below.

PROS OF SODA ASH NEUTRALIZATION

- Does not raise hardness of water (may not need a water softener)
- Gives more precise control of pH (can control solution strength and injection time)
- Does not require post-filter

CONS OF SODA ASH NEUTRALIZATION

- More expensive than calcite system
- Requires electricity
- Must mix up liquid solutions periodically
- Pump needs servicing annually
- Needs larger footprint

877-609-2837

Kinetico® water systems