

# Alkalinity

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When I began this article, I considered many of common problems I had seen this past year at water systems. But as I began research and writing, it became obvious that alkalinity was misunderstood or just ignored and was a huge part of many of the common problems that caused either treatment issues, or as I believe led to positive lead and copper problems.

Most of us know that according to the Oregon rules, we need to maintain our water level pH between 6.0 - 9.0, but as more and more of us are told, to maintain a higher pH of 7.0 and usually, 7.4. Many systems are now required to raise pH to 7.4 or higher to control lead and copper issues and often, we haven't checked our alkalinity levels. As you read the rest of this article consider the following information.

Total Alkalinity is an important test in determining the aggressiveness or scale tendency of the water. If the total alkalinity is low, the water may be aggressive and cause corrosion to pipe work and structures. If the total alkalinity is high, the water may more readily promote scale formation. This may cause problems in homes especially in hot water heaters. Alkalinity control is therefore an important part of many water treatment programs. Because alkalinity varies greatly due to differences in geology, there are not general standards for alkalinity through state reporting requirements. Levels of 20-200 mg/L are typical of fresh water. A total alkalinity level of 100-200 mg/L will stabilize the pH level in a stream. Levels below 10 mg/L indicate that the water is poorly buffered, and is very susceptible to changes in pH from natural and human-caused sources. While trying to maintain 100mg/L in our surface water stream is not feasible, controlling either our raw water or finished water is. But we need to establish and control just what we are trying to do and we must be responsible on how it is done and what works best with the water source and chemical that are being used. Which type of disinfection whether it is gas, calcium or sodium hydrochloride can have an effect on both pH and alkalinity. Gas has a higher probability for reducing both pH and alkalinity and in some cases calcium or

sodium hydrochloride can increase alkalinity in your water.

Alkalinity is a measure of the buffering capacity of water, or the capacity of bases to neutralize acids. Measuring alkalinity is important in determining a water's ability to neutralize acidic pollution from rainfall or wastewater. Alkalinity does not refer to pH, but instead refers to the ability of water to resist change in pH. The presence of buffering materials helps neutralize acids as they are added to the water.

Total alkalinity is the measure of the amount of alkaline buffers (primarily carbonates and bicarbonates) in your water. These alkaline substances buffer the water against sudden changes in pH. Total alkalinity is considered the key to water balance. It is the first parameter you should balance when making routine adjustments to your water. If you neglect to check the total alkalinity in your water source, you may have trouble balancing the pH. You may also notice that pH fluctuates suddenly despite your best efforts to keep it in the ideal range. If the alkalinity is too low, anything introduced to the water will have an immediate impact on pH. Abrupt shifts in pH can cause scaling or corrosion of metal equipment and fixtures as well as other problems. When the total alkalinity is high, the pH has a tendency to drift upward, causing scale to form.

Maintaining an ideal level of alkalinity will protect your water system and users from the harmful effects of sudden pH fluctuations. Think of the alkalinity as an indicator: it keeps the pH in balance without allowing it to tip too far to either side. Of course the pH can still drift upward or downward, but that change will happen gradually as long as the alkalinity falls within the ideal range. This level will probably be different on each system.

When adding chemicals for alkalinity try different injection points, again there is no right or wrong point of injection. Some water sources like pre-injection while others respond to post injection. Keep in mind however that if you pre-inject, you may be wasting chemicals that are removed in the filtering process, but on the other hand it may be needed to form floc. It totally depends on the chemistry of the raw water and the coagulation chemicals being used.