

ENGINEERING LETTER A-223
COMPARISON OF ALKAGEN® SOLUTION TO OTHER ALKALINE TECHNOLOGIES
FOR ODOR AND CORROSION CONTROL

Evoqua's team of engineers and scientists is widely recognized as the most experienced and authoritative body of odor and corrosion control specialists assembled within any vendor organization worldwide. Evoqua's expertise with a diverse range of odor and corrosion control technologies is well known. Therefore, we are often asked why we do not use compounds such as sodium hydroxide or magnesium hydroxide to provide alkalinity supplementation for odor and corrosion control. Sodium hydroxide is an aggressive, hazardous compound and in recent years costs for sodium hydroxide have been very volatile. Other, non-hazardous alkaline supplements with lower and more stable costs are available, causing sodium hydroxide to be quickly eliminated from consideration.

In recent years manufacturers of magnesium hydroxide have marketed their product to the wastewater industry. While magnesium hydroxide is indeed a non-hazardous alkaline supplement, we believe that the addition of magnesium-containing compounds to municipal wastewater presents the potential for unintended consequences. Magnesium, ammonia, and phosphate are the three constituents of struvite, a crystalline deposit that causes costly plugging and blockages in many wastewater treatment facilities, particularly in digesters. Usually, ammonia and phosphorous are abundant in digesters and magnesium is the limiting constituent. If magnesium is added to such a system, formation of struvite is likely to occur. One technical paper discussing struvite states "The alkalinity supplement can contribute to the solution or the problem. Magnesium hydroxide contributes to the problem by increasing the magnesium load to the digester."ⁱ

While struvite is a major operational concern to most wastewater facilities, Alkagen® Solution offers other advantages over magnesium hydroxide. Alkagen® Solution is superior to magnesium hydroxide in these key areas:

- **pH Range.** Alkagen can elevate the pH of wastewater to 9 or greater, providing a shift of over 99.9% of dissolved sulfide to the non-volatile HS⁻ ion. Magnesium hydroxide is "self-buffering" to a pH of 8.5, leaving 3% of sulfide present as H₂S – enough to cause odors and corrosion, particularly in turbulent unit processes.
- **Controllability.** With its wide pH range, Alkagen® Solution can be adjusted to the pH needed for a given application and controlled to maintain that pH using Evoqua's VersaDose® technology. This eliminates product overfeed and waste. Magnesium hydroxide is "self-buffering" to pH 8.5, making it impossible to detect when too much product has been fed and impossible to control automatically.
- **Rapid dissolution.** Alkagen® Solution rapidly dissolves in wastewater, providing an almost instantaneous effect. Pump stations can usually be treated by applying Alkagen® Solution to an influent manhole. Magnesium hydroxide takes 30 minutes or more to dissolve, meaning it must be fed at pump stations upstream of the desired control point.

- Struvite. Alkagen® Solution does not add magnesium - a key component of struvite - to wastewater systems. Magnesium hydroxide does.

Summary

The following table contains a summary of features of alkaline supplements:

	Alkagen® Solution	Sodium hydroxide	Magnesium hydroxide
Hazardous Rating	Non-Hazardous	Hazardous	Non-Hazardous
Achieve pH 9 for Complete Sulfide Solubility	Yes	Yes	No
FOG Control	Yes	Yes	Yes
Liquid Sulfide prevention	Yes	No	No
Dose-to-demand	Yes	No	No
Contributes to struvite	No	No	Yes

Evoqua's Alkagen® Solution is a non-hazardous blend of alkaline enhancement and dissolved sulfide prevention technologies that will cost effectively control odors and corrosion in your system. Alkagen® Solution will reduce the impact of FOG in collection and treatment systems, and will reduce the dissolved sulfide load on treatment plants. Alkagen® Solution has significant operational and cost advantages over other alkaline enhancement products.

For a free analysis and review of your collection system followed by a treatment recommendation, consumption rate prediction, and no-risk product demonstration, please contact the Evoqua Water Technologies Municipal Services Representative in your area or call our main office at 1-800-345-3982.

ⁱ Baur, Rob, et al. 2002. Struvite Control – A Common and Nuisance. WEFTEC 2002. Water Environment Federation.

Alkagen® is a proprietary technology of Evoqua Water Technologies. Evoqua Water Technologies is the sole provider of this product and technology. Purchase of Alkagen® allows the purchaser a license to practice the technologies as described in US Patent Nos: US 7,087,172. US 7,186,341 B2, and other patents pending.