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EDITORIAL

FEATURE

Utilities Taking A New Look At Dry Chlorine by James P. Brennan

Chlorination has long been the conventional method for disinfection of municipal water and wastewater, due to its low chemical cost and consistent performance. By the early 1990s, however, the growing number of environmental mandates, along with health and safety requirements associated with Cl_2 use were forcing many municipalities to take a hard look at their disinfection programs.

In response, many plants began taking steps to reduce or eliminate the use of chlorine gas by switching to alternative forms of disinfection. One such alternative is dry chlorine in the form of calcium hypochlorite briquettes.

Calcium hypochlorite, $Ca(OCl)_2$, has a long history in U.S. water and wastewater treatment. In 1927, as U.S. cities were in the early stages of using chlorine gas, liquid chlorine, and bleaching powder to treat drinking water and wastewater effluent, Mathieson Alkali Works - a key predecessor company to today's Arch Chemicals - achieved a major breakthrough when it introduced the first dry chlorine product in granular form. This calcium hypochlorite compound, which it called HTH® (for High Test Hypochlorite), not only dissolved easily in water, but was more

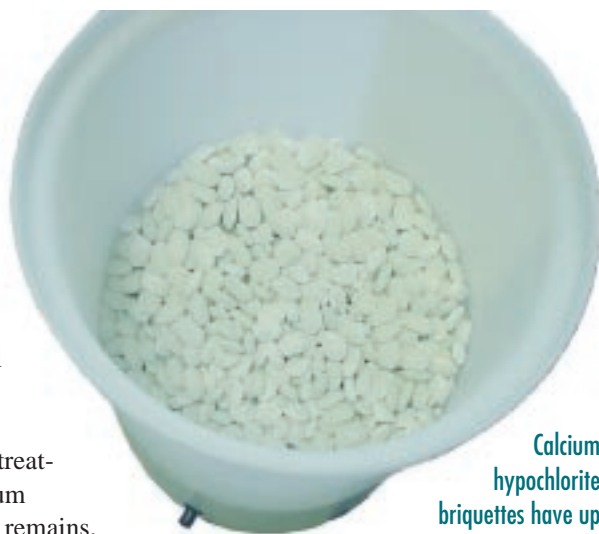
stable than bleaching powders and offered twice the available chlorine content.

At that time, many municipal officials responsible for sanitizing drinking water also oversaw the operation of public swimming pools, where calcium hypochlorite was widely adopted for sanitation of swimming pool water. While Cl_2 eventually became the prevalent sanitizing agent for water and wastewater treatment in subsequent years, calcium hypochlorite remained, and still remains, at the forefront of swimming pool water sanitation.

HTH and other calcium hypochlorite products have been improved significantly over the years to increase their efficacy, stability and cost-effectiveness.

No longer just a "pool water sanitizer," new forms and formulas, such as Arch's Constant Chlor® Plus Briquettes, are now available to the water and wastewater industries.

Calcium hypochlorite briquettes contain a minimum of 65 percent available chlorine ($AvCl$) by weight. A typical chlorinator incorporates three primary components: a briquette hopper, a manifold spray section and a



Calcium hypochlorite briquettes have up to a 2-year shelf life.



Arch Chemicals' new Constant Chlor® Plus calcium hypochlorite briquette feed system allows operators to adjust solution concentrations from 0.5 to 1.7 percent $AvCl$.

discharge tank. The briquettes are scooped into the chlorinator's hopper. The spray manifold uses supply water to dissolve the highly soluble briquettes and prepare a fresh, relatively dilute chlorinating solution of less than 2 percent. The solution falls into the unit's discharge tank and is then pumped on demand to the injection point through a chemical metering pump.

Benefits, Advantages

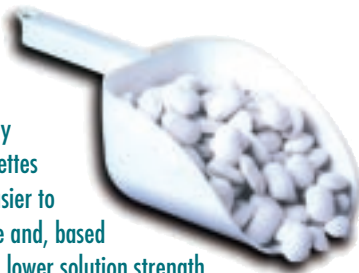
In numerous drinking water applications, such as wellheads, small- to medium-sized surface water treatment plants and booster stations, calcium hypochlorite briquettes and chlorinator systems can provide numerous benefits. The same is true for many wastewater applications, including small- to medium-sized treatment plants (up to 6 mgd) and

EDITORIAL FEATURE

water reclamation facilities. Some of the benefits and advantages include:

- *Longer chemical shelf life.* Calcium hypochlorite briquettes have up to a 2-year shelf life.
- *Onsite Generation.* By making a fresh, dilute hypochlorite solution only as needed, a facility eliminates either bulk solution or large cylinder storage, thereby simplifying storage and handling while alleviating numerous safety and liability concerns.
- *No off-gassing.* Calcium hypochlorite solutions from this system are stable. Chemical metering pumps do not become air-bound.
- *Corrosion control.* Calcium hypochlorite solutions are less corrosive than bleach. And, because bulk liquid disinfection chemical storage is eliminated, the associated corrosive fumes are also eliminated.
- *Operator Safety.* The dry chemical is easier to handle and, based on the lower solution strength, calcium hypochlorite use provides for reduced potential hazards to plant personnel.
- *Less Restrictive.* Calcium hypochlorite briquettes need to be stored as Class I oxidizers, but do not require expensive secondary containment. Nor are they bound by restrictive chemical tank and transfer station requirements.
- *Small footprint.* The footprint of the Arch calcium hypochlorite feed system is only 14.5 sq.ft., and no bulk liquid storage or containment is required.
- *Reduced vulnerability.* Potential plant vulnerability is reduced with the calcium

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hypochlorite system. There are no storage tanks or pressurized vessels. The system can easily be located indoors and out of sight.

Feed Systems

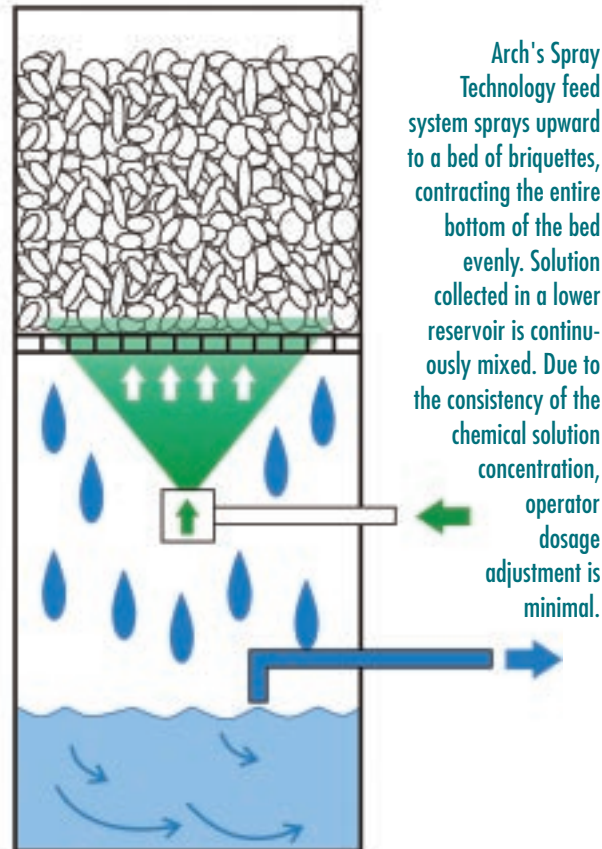
Calcium hypochlorite is an extremely soluble material. Because of this, in the early years no automatic feeders were available and solutions were prepared manually. Eventually “flow-thru” feeders appeared but were inconsistent. As a result, cal hypo had long been relegated to a “back-up” role in water and wastewater applications. However, new feed systems today are markedly different from calcium hypochlorite feeders of the past.

With the Constant Chlor Chlorinator, for example, Arch has designed a feed system and briquette product that work with the natural properties of calcium hypochlorite to achieve solution consistency within 0.1 to 0.2 ppm of the desired target range at all times.

The Arch Spray Technology system has a feed rate capacity per unit of up to 250 lbs/day AvCl, and an optional dilution feature enables operators to adjust solution concentrations from 1.7 to 0.5 percent AvCl, adapting the same equipment to smaller sites and providing standardization for the utility. SCADA monitoring capabilities, low level alarms and many additional advanced features further enhance operation, maintenance and safety.

Conclusion

Although commercial bleach has a lower price point than calcium hypochlorite briquettes, the total cost of bleach is often another story. The capital cost for a calcium hypochlorite spray feeder system is typically less than half of a comparable NaOCl system. And, when a facility considers capital and operating costs



Arch's Spray Technology feed system sprays upward to a bed of briquettes, contracting the entire bottom of the bed evenly. Solution collected in a lower reservoir is continuously mixed. Due to the consistency of the chemical solution concentration, operator dosage adjustment is minimal.

combined - including the indirect cost penalty for NaOCl degradation, dosing pump failures due to off-gassing (with the associated manpower costs), the long-term cost of corrosion, as well as increased safety, liability, and regulatory compliance costs - the higher cost of the dry chemical is more than mitigated. **ww**

About the Author:

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