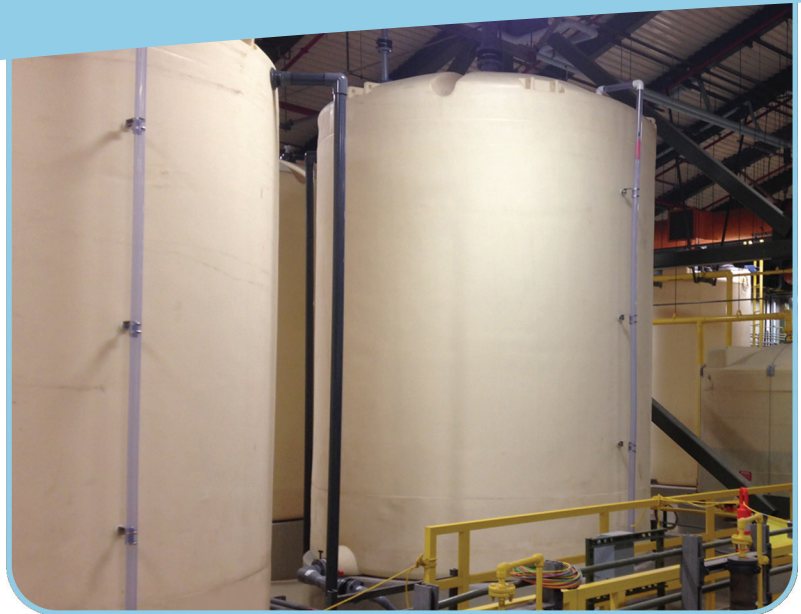


The Complete Chemical Storage Guide for Wastewater Treatment

How to build effective storage solutions for chemicals commonly used in the wastewater treatment process



Introduction

In addition to physical treatment (such as screening and filtering processes) and biological treatment (which includes oxidation ponds and lagoons), chemicals are essential in wastewater treatment. Wastewater treatment requires even more aggressive usage and larger amounts of chemicals than municipal drinking water treatment. As a result, proper and safe storage of the chemicals used in the wastewater treatment process is always an important consideration.

This guide was developed to address common chemical storage challenges found in wastewater treatment and to provide sensible storage solutions. In the first section, we outline the five steps of a wastewater treatment process, as well as the common chemicals involved in each step. In the second section, you'll learn more about each chemical, along with its appropriate storage considerations.

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TABLE OF CONTENTS

The Roles of Chemicals in the Wastewater 3

Starting with the Chemical-Tailored Storage for Lifetime Cost Savings 4

Sodium Hypochlorite 5

Sulfuric Acid 6

Ferric Chloride, Aluminum Chloride, and Polymers 7

Sodium Hydroxide 8

Hydrochloric Acid 9

How to Build the Perfect Storage System for Your Wastewater Application 10

About Poly Processing 10

The Roles of Chemicals in the Wastewater Treatment Process

Removing Solid Particles

To facilitate the removal of solid particles within wastewater, chemicals such as ferric chloride, polymers, and alums are used to produce positive charges. These are intended to neutralize negatively charged solid particles. As a result, the solid particles clump together, making removal easier. Since more solids exist in wastewater than municipal water, more chemicals are required for this coagulation process.

Neutralization

Neutralization, or the adjustment of the pH levels of wastewater with the addition of an acid or a base, is common in wastewater treatment. Either sulfuric acid or another base chemical (typically sodium hydroxide) may be added to the water to achieve optimal pH balance.

Odor Control

The collection and treatment of industrial wastewater can result in some unpleasant odors. Chemical treatment is used to control odor at the treatment facility. In addition to activated carbon, wet scrubbers are used to reduce odors. It's very common to see sodium hydroxide and calcium nitrate. Hydrochloric acid is also used in conjunction with media in the scrubbers.

Disinfection

To prevent the spread of disease, microorganisms that are pathogens must be destroyed or removed from wastewater. A common, relatively safe and inexpensive disinfecting chemical is sodium hypochlorite.

Sludge Treatment and Removal

A polymer chemical is typically used to remove water from the sludge to reduce volume, making transporting the sludge to the landfill easier and less expensive.

Starting with the Chemical-Tailored Storage for Lifetime Cost Savings



Every Poly Processing chemical storage system that we build [starts with the chemical](#) being stored. Thoroughly understanding the chemical and the nuances of the chemical's properties is vital to maximize the operation and performance of the chemical delivery system, as well as the longevity of the chemical storage tank. The storage tank is the headworks of the system. It is a critical component to the overall process involving the use of the chemical. If the design of the storage tank is wrong, it could lead to serious problems.

If you simply design a tank based on generic factors such as size, material, and capacity without defining the chemical used within the tank, you risk getting a non-optimal tank.

Also, it's important to consider the effect that chemical properties have on the other component parts of the chemical storage system. Expensive valves, fittings, pumps, and flow meters, all essential parts for proper operation, could potentially be compromised.

Let's take a look at some of the most common chemicals in the wastewater treatment process and system components required for proper storage of each.

SODIUM HYPOCHLORITE



Sodium hypochlorite, or bleach, is one of the most common chemicals used to eliminate bacteria and viruses, especially towards the end of the process, in the disinfection stage.

Storage Considerations for Sodium Hypochlorite

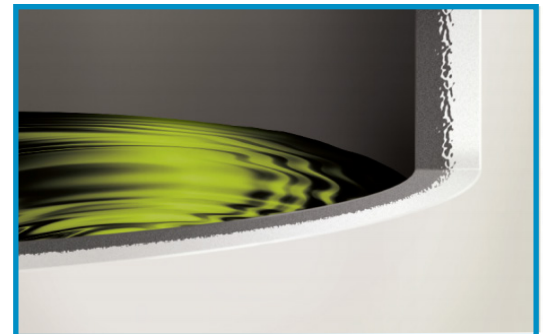
Sodium hypochlorite presents several major chemical storage challenges, including the break down under UV light exposure, the fact that it tends to contain transition metals such as nickel, iron and copper that accumulate in the tank and create off-gassing exposure, and that it aggressively oxidizes.

Since sodium hypochlorite is an aggressive oxidizer, the opportunity for the chemical to escape the storage tank must be limited through wetted connections and side fittings. This will reduce leak paths that can cause damage. In addition to oxidation, sodium hypochlorite is sensitive to transition metals, found in some common tank fittings. These will quickly degrade the chemical while causing off-gassing and even more aggressive oxidation.

Proper Storage of Sodium Hypochlorite

One key to storing sodium hypochlorite is to use [carbon black](#), white, or gray compound XLPE resin to dramatically reduce UV degradation of the chemical, as well as mastic coatings and insulation.

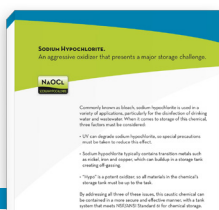
Tank Design: We recommend our cross-linked polyethylene for strength as well as our [OR-1000™ system](#) to prevent oxidation. This combination seamlessly bonds interior anti-oxidation with a maximum strength outer surface.



Our OR-1000™ system offers an internal anti-oxidation layer to maintain safe chemical storage

Fittings/Accessories: To prevent the potential buildup of transition metals in the tank we also recommend the use of our proprietary IMFO® system. This special, integrated flange is molded into the tank, preventing chemical contact with any surfaces other than polyethylene. It also allows for full drainage of the tank, which can greatly increase the half-life of the chemical. Any additional fittings should be PVC.

Any gaskets should be made of EDPM or Viton GF to meet NSF-61 Certification. Should bolts be needed, we recommend titanium, in order mitigate the risk of off-gassing.



Download the complete Sodium Hypochlorite storage guide

<http://tanks.polyprocessing.com/sodium-hypochlorite-guide>

SULFURIC ACID



Sulfuric acid is the most commonly used acid in the world, often during wastewater neutralization. Proper storage presents two main challenges: the weight of the chemical and its nature as an aggressive oxidizer.

Storage Considerations for Sulfuric Acid

The **inherent weight** of sulfuric acid requires a strong material to withstand the static load pressure pushing on the bottom third of the storage tank. When storing sulfuric acid, it's important to verify the hoop stress rating and understand specific gravity ratings, ensuring the resins used in the storage tank provide a margin of safety. Volume changes and temperature variations affect the tank walls as well. In addition, the concentration weight will limit the size of the storage tank.

Sulfuric acid is also an **aggressive oxidizer**, meaning safeguards are required to prevent structural degradation of the tank's polyethylene material. Such damage can result in leaks or failure of the tank.

Proper Storage of Sulfuric Acid

Tank Design: The [molecular strength of XLPE](#) and thicker tank walls provide the structural support required for storing this heavy chemical. These aspects are particularly important in the bottom third of the tank, where high levels of load are concentrated.

If secondary containment is present, we recommend the use of an [IMFO® system](#) instead of mechanical fittings, which maximizes the tank's structural integrity. Combine this tank design with the OR-1000™ system, and oxidation is reduced dramatically.



The IMFO® outlet ensures long-term performance of the overall system.

If secondary containment is not present, we recommend the SAFE-Tank® “tank-within-a-tank” system, which is designed with OR-1000™ to limit the risk of oxidation. Along with containing the chemical from its surrounding environment, this double-walled tank greatly lowers the risk for hazardous contact of sulfuric acid with water.

Fittings/Accessories: To meet NSF-61 certification, use Viton® GF gasket material.



[Download the complete Sulfuric Acid storage guide](#)

<http://tanks.polyprocessing.com/sulfuric-acid-guide>

FERRIC CHLORIDE, ALUMINUM CHLORIDE, AND POLYMERS



Polymers are used in the headworks of wastewater treatment to facilitate flocculation. They also aid in the de-watering of digester cake, reducing water content while permitting easier, less expensive transport of waste materials to the landfill.

Polymer Storage Challenges

Because polymers are **very slippery chemicals**, there is always a danger of slips and falls resulting from spills or leaks. In addition, polymers can be an **environmental stress crack agent**.

Proper Storage of Ferrics, Alums, and Polymers

Tank Design: An IMFO® system is ideal for sludge control and ease of cleaning, since the tank drains at its true bottom. Heat pads and insulation can help keep the chemicals at the optimal temperature, greatly reducing the chance of separation and settling.

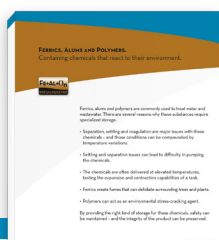


Heating pads and insulation help maintain optimal temperature for polymers that run the risk of separating or settling.”

The crosslinked construction of these tanks allows for greater expansion and contraction, while maintaining structural integrity, lessening your risk for tank failure.

Fittings/Accessories: A mixing system can also be installed to keep the chemicals from separating.

Chemicals like Ferric Chloride, Ferric Sulfate, Ferrous Chloride, and Ferrous Sulfate require titanium bolt material, while stainless steel bolts should be used for aluminum sulfate and other various polymers. [A SAFE-Surge® manway cover](#) is recommended on pneumatically loaded systems to support tank longevity.



Download the complete Ferrics, Alums, and
Polymers storage guide

<http://tanks.polyprocessing.com/ferrics-alums-polymers-guide>

SODIUM HYDROXIDE



Sodium hydroxide is commonly used in wastewater treatment to adjust or neutralize the base pH levels. Similar in use to sulfuric acid, it is able to balance the wastewater pH.

Sodium Hydroxide Storage Challenges

Sodium hydroxide is another “slippery” chemical that tends to find weak points under storage. It is also **highly corrosive** to tissue and toxic if ingested, making exposure to workers a potential danger. In addition, if sodium hydroxide is not stored at appropriate temperatures, the chemical will crystallize and turn into a solid, resulting in unnecessary chemical waste and damage to the storage system itself.

Proper Storage of Sodium Hydroxide

The key to storing sodium hydroxide properly is strong, safe containment. Since the chemical is so corrosive, secondary containment is a must.



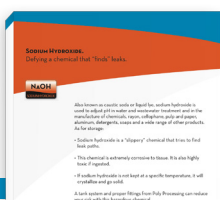
This tank-within-a-tank system provides 110% secondary containment for safer chemical storage.

Tank Design: If secondary containment is available, the IMFO® tank is recommended. IMFO® systems are ideal for Sodium Hydroxide Systems because their flange is actually a molded part of the tank, and not an insert that could leak or fail.

The IMFO® outlet eliminates the need to drill into the sidewall of the tank to install a mechanical fitting, which can create a maintenance issue for this chemical, thus ensuring long-term performance of the overall system.

When secondary containment is not available, a [SAFE-Tank®](#) can meet this requirement. This double-walled tank extends the margin of safety by providing 110% secondary containment.

Fittings/Accessories: A 50% concentration requires stainless steel bolt material, EDPM gaskets, and a 1.65 specific gravity rating. A SAFE-Surge manway cover is recommended if pneumatically filling the tank, otherwise a bolted manway cover. Additional options include mixer mounts, heating pads, and restraints depending on where the tank is located.



Download the complete Sodium Hydroxide storage guide

<http://tanks.polyprocessing.com/sodium-hydroxide-guide>

HYDROCHLORIC ACID



Hydrochloric acid is a pungent liquid with highly corrosive properties. While hydrochloric acid has several different applications, in wastewater treatment HCL is used to control odors that come from industrial wastewater.

Hydrochloric Acid Storage Challenges

Again, as hydrochloric acid has an extremely low pH, it is **highly corrosive**. Thus, the chemical generates toxic fumes that can be harmful or fatal to employees. These fumes also present a tank maintenance issue. Entering the tank for cleaning must be avoided at all costs and parts replacement minimized.

Proper Storage of Hydrochloric Acid

Storing such a corrosive chemical takes a truly specialized system. Poly Processing resolves these issues with its tank, venting and fittings solutions



Scrubbers are installed to remove or neutralize the harmful substances emitted from the storage of chemical

Tank Design: An Integrally Molded Flanged Outlet, or IMFO®, allows for complete drainage of the tank, which eliminates the need to enter the tank for cleaning, and also reduces chances of having to replace parts, as the drainage system is part of the tank's mold. This is imperative when dealing with such a strongly fuming chemical.

Fittings/Accessories: [Scrubber systems](#) are used to control the fumes. No restraint or ladder attachment bands circumscribing the tank are allowed. Cable restraint systems must pass cables over the top of the tank. Hydrochloric acid requires the use of flexible connections with fittings on lower third of sidewall.



Download the complete **Hydrochloric Acid storage guide**

<http://tanks.polyprocessing.com/hydrochloric-acid-guide>

How to Build the Perfect Storage System for Your Wastewater Application

Now that we've reviewed the specific components required for storing chemicals used in wastewater treatment, you may have questions about tank specifics, how to order a tank, or what a tank package might cost.

We're happy to help you build a chemical storage tank system that meets your specific storage requirements.

Contact a chemical storage expert today to get started.

Send a message: <http://www.polyprocessing.com/contact-us>

Email: sales@polyprocessing.com

Phone: 877-591-4827

Or, request a tank quote to receive a price estimate on a tank package.

Online Quote Request: <http://www.polyprocessing.com/contact-us/request-a-quote>

About Poly Processing

Known as a leader in crosslinked polyethylene chemical tanks, Poly Processing is a company dedicated to storage safety, as well as operational- and cost-effectiveness. This national company has worked to raise the standards of the industry and continually develops new and better storage concepts that are based on client feedback.

Formerly known as the Abell Company, Poly was founded in 1955 as an agricultural distribution service. In 1970, the Abell family recognized a need for better storage solutions for corrosive chemicals. They developed a process for rotomolded, crosslinked plastic storage as an alternative to FRP, stainless steel and lined steel. Today, Poly Processing has manufacturing facilities in Louisiana, California and Virginia.

Poly Processing works with industry professionals and major educational facilities to research and develop further advances in chemical storage.

While Poly is known for its technological innovations, it is also known for its human approach to business and service. Here, every phone call is answered by a person, not a machine - and customer service is at the heart of all we do.

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Environmental Statement

At Poly Processing, we know that chemical storage isn't just about business processes. It's about protecting our environment from harm. So our company constantly strives to create smarter, safer ways to contain, maintain and transfer chemicals. By bringing new and better ideas to the industry, we're safeguarding our planet. It is part of our commitment to continually seek better solutions to chemical storage challenges.

Poly Processing Company manufactures engineered high density crosslinked polyethylene chemical storage tanks. Because we choose to use an engineered, high quality crosslinked polyethylene, our tanks have a greater life expectancy than other tanks made of commodity resins. We continue to develop materials which are more robust in the harshest environments. This life expectancy can be 3 times longer than a tank manufactured from commodity linear resins which in turn:

- Reduces the amount of materials being landfilled by 66%
- Reduces natural gas consumption by up to 70%
- Reduces the diesel fuel used to ship the products to the end user by up to 66% as well as reducing the fuel used to transport the tank to the landfill

Poly Processing Company is working with 3rd party companies to repurpose as much of the crosslinked polyethylene as possible .

We are committed to a sustainable future and to improving the environmental well being of our customers and their communities.