HYPO SOURCE

ON-SITE DISINFECTANT GENERATION

2022 Newsletter Compilation

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ON-SITE DISINFECTANT GENERATION

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CLINICAL CLEANING PROTOCOLS

We get it, changing your cleaning protocols sounds like a headache. If you're a hospital administrator or healthcare worker, you already have enough work to focus on. Adopting a new method can feel overwhelming, but with hypochlorous, it is actually easy.

Hypochlorous acid generation is about as simple as it gets and will easily fit into your current cleaning routines. To help make that transition even easier, Hypo Source has compiled a set of cleaning protocols for clinical settings, with general guidelines you can use to determine what changes you'll make in your own routine. And we are here to help!

For therapy and wound treatment (eg; wound cleaning, post-operative application, Daiken method) use 200 ppm (mg/liter) or less.

Use HOCl to clean floors and surfaces as a direct replacement for Jik or bleach. Clean first with soap and water and then fog, spray or mop on hypochlorous at 500 ppm and leave to dry.

Use HOCl as a replacement for quaternary compounds when cleaning operating theaters. Clean between operations with cloth and 500 ppm hypochlorous and leave to dry. Fog or spray the theater (if possible). Every 10 cleanings, it's recommended to do a pure water clean to remove any sodium traces.

In the sterilization room, use 200 ppm to wash instruments before wrapping. A 2-minute soak time is recommended.

Hypochlorous can be prescribed from the pharmacy to treat infections of the eyes, mouth or skin. In most situations 200 ppm should be used. Apply via spray, topical dressing or soak where available. Apply every three hours until relief is achieved.

Hypochlorous can be used to replace almost any application where Jik or bleach is used except in washing of clothes. Hypochlorous can also replace quaternary compounds and alcohol where allowed by regulation. Do not dilute the hypochlorous produced from the Hypo. Mix to the desired strength and use accordingly.

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IS HYPOCHLOROUS ACID EFFECTIVE AGAINST MOLD?

Mold comes in all shapes, sizes, and colors. There are over 100,000 types of mold, from the fuzzy green variety on that sandwich your kid left in their backpack to the blue streaks in an expensive wheel of cheese. While some types of mold are beneficial (think penicillin), others are extremely harmful and can have devastating long-term effects to your health and home.

Mold can be one of the most difficult microorganisms to eradicate through cleaning. This is largely due to its physical structure. Mold is a fungi comprised of thousands of microscopic spores. Mold is spread when these spores are released into the air, where they can then embed themselves deep within fabrics, organic materials, and even the paint of a wall. As mold spreads, it can release mycotoxins into the air. These toxins are believed to be harmful to human health.

The pervasive nature of mold, combined with the difficulty in distinguishing between different varieties of mold, makes it especially challenging to contain once it has been established in a material. Mold requires water and carbon in order to grow, so one of the most common ways to remediate a mold infestation is to completely dry out the area and remove the organic material the mold could grow on.

The research around hypochlorous acid and mold eradication is primarily focused on agricultural and healthcare applications. While HOCl is lauded as a fungicide and sporicide, this should not be used as a blanket statement to cover all types of mold. Indeed, hypochlorous acid has not been tested against many mold varieties and has been shown to be ineffective against some varieties.

Based on the current literature, we know the following: In a study of fruit rot fungi on strawberries, researchers found that hypochlorous is effective against *Botrytis cinerea* and *Monilinia fructicola* (brown mold) at a minimum of 50 ppm. Concentrations of 40 ppm HOCl achieved a 2-log reduction in *Cladosporium cladosporioides* (common indoor mold) and *Rhodotorula mucilaginosa* (orange yeast). An ophthalmology study found that 100 ppm of HOCl could achieve a 99.99% reduction of *aspergillus* mold varieties, *candida albicans, mucor indicus*, and *fusarium solani* within 1 minute. *Aspergillus niger*, or black mold, is one of the most common forms of mold found within homes. Research shows it can be inactivated at 86 ppm with a 2-minute contact time. A Korean study showed that *Mycobacterium* and *Candida* varieties can be inactivated at >40 ppm within 1 minute.

Of course, there are likely other species of mold and yeast that HOCl is highly effective against, but without the scientific research to prove it, we cannot make assumptions. With minor mold infestations, the mold may be treated with a HEPA vacuum and then a thorough round of disinfecting (HOCl could be used at this stage). However, if you are concerned about a mold infestation in your house, we recommend getting a professional opinion before attempting to treat it.

HYPO 7.5 LAB TESTS

Laboratory testing is one of the best ways to ensure the solution you are producing with your machine is doing the work you want it to do. The European Union has established a set of tests that qualify disinfectants for specific pathogen eradication. These European Normstandards (often referred to as EN tests) are one way to indicate your legitimacy as a disinfectant producer and to provide your customers with peace of mind. You can have your solution tested at private or public laboratories to these standards.

Several of our partners have tested the hypochlorous produced from the Hypo 7.5 according to these EN standards. For example, in Singapore, the Hypo passed the EN14476. This test evaluates the efficacy of 250 ppm hypochlorous in one minute of contact time against the human coronavirus. HOCl made by the Hypo also passed EN1276 and EN1500, achieving a >5 log reduction on *E. coli, P. aeruginosa, S. aureus*, and *E. hirae* (test EN1276). Similar results have been obtained by our customers in Greece and Kenya. In Greece, the hypochlorous produced in the Hypo 7.5 passed the EU requirements for biocidal disinfection and in Kenya it was approved by the Kenyan Bureau of Standards.

It is interesting to note that while hypochlorous can't kill all yeasts and molds (as discussed in page 1 above), it did kill 99.90% of *Candida albicans* and *Aspergillus brasiliensis* in the EN1650 test in Singapore. This is a 3 log reduction and a fantastic outcome for real-life applications. 99.90% of anything is impressive! Unfortunately to pass the EN test, it needed to kill 99.99% of the specimens (instead of 99.90%), so our customer will need to try that test again.

READING LINKS

Mold remediation procedures

Black mold study

Strawberry fruit rot study

Korean study on Mycobacterium & Candida

Black mold and pink yeast study

EN Test Standards

Boston keratoprosthesis study

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BOTTLED HOCl: A CONSUMER'S REVIEW

We talk a lot about the benefits of making your own hypochlorous acid from a business owner's perspective; you'll save money, time, reduce supply chain dependency, etc. But what about the home consumer? Does it matter if they buy their HOCl in a bottle or make it at home? Well, speaking from personal experience, I would say it does matter. I've been without a HOCl generator for the last 6 months, so I've been purchasing bottled HOCl online to use for cleaning, wound/skin care, plant health, and food prep. Here are the two main issues I've noticed based on my experience over the past few months.

1 PRICES VARY WIDELY

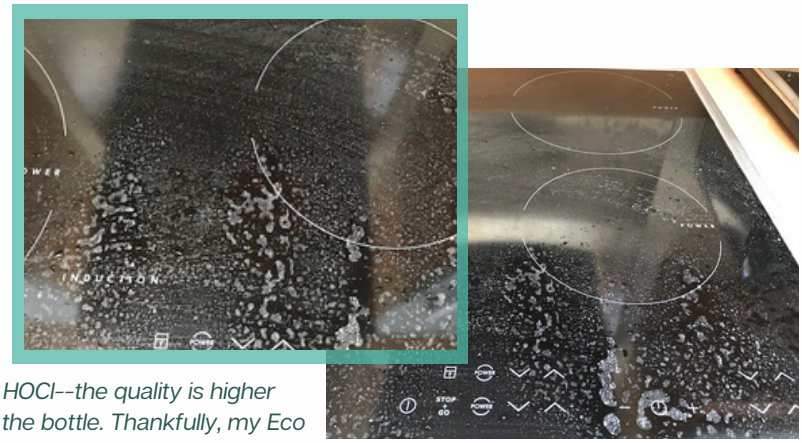
£5.99

£14.99

These bottles were purchased within 5 months of each other. The first one I purchased (HOWCLEAN) was 1/3 of the price of NatraSan, yet had a higher ppm (200 vs 150). Both products had the exact same quantity (500 ml). When I purchased the NatraSan bottle a few weeks ago, it was the cheapest one I could find on Amazon.

2 QUALITY IS QUESTIONABLE

This is my stovetop a few hours after I sprayed it with the NatraSan. I've never experienced a salt residue like this with HOCl I've made at home. Of course, this is only a minor frustration, but what's actually worrying to me is not knowing what's in the bottle I purchased, especially since I use HOCl on my skin, food, and as a mouthwash. If the salt content is that high, I wonder what sort of process they're using.



Not only is it much cheaper to make my own HOCl--the quality is higher and I don't have to worry about what's inside the bottle. Thankfully, my Eco One just arrived from the States, so my days of bottled HOCl are over!

THE HYPO 7.5: AN OVERVIEW

The Hypo 7.5 is a one-of-its-kind hypochlorous acid generator. It is mid-sized, which makes it the ideal solution for businesses who are looking to get started making their own hypochlorous but aren't ready to shell out thousands of dollars on an industrial-sized system. Plus, the Hypo's compact size and lightweight design make it easy to carry and quick to assemble.

The Hypo 7.5 can generate 7.5 liters (2 gallons) of 200 ppm hypochlorous acid within 8 minutes. The machine also comes with the option to make 500 ppm (20 minutes) or 1,000 ppm (40 minutes). We offer a 5-year or 2,000-hour warranty, and we're always happy to troubleshoot any issues or questions you have. The machine contains a titanium electrolysis cell that is used in the commercial aquatics industry, which we chose specifically for its durability and long life. The only inputs for the machine are water, salt, and vinegar, plus a very small amount of electricity (about as much as a small lightbulb).

HOW TO OPERATE

1. Add water to the Hypo tank.

2. Add salt and vinegar.

3. Choose the strength by pressing the 'select' button.

4. Press 'start' and the cell will begin to bubble.

[HYPO 7.5 DATA SHEET]

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THE CLEAN HYPE

FAQ'S: GROWER'S EDITION

SHOULD I ADD HOCI TO MY SOIL-BASED CROPS?

We don't recommend using HOCl to disinfect soil because it is an oxidizing solution, which means it will focus on breaking down the nearest organic compounds first. Soil is full of organic material, so the disinfecting potential of hypochlorous will be greatly reduced as soon as you add it to the soil. However, it can be effectively used to sanitize growing media such as clay pebbles or perlite, and can still be added to water lines in soil-based systems to prevent algae or biofilm blockages in the line.

WHAT IS THE RECOMMENDED DOSAGE FOR CONSTANT ROOT CONTACT?

The recognized safe limit for constant chlorine exposure to plants is between 2-5 ppm, according to multiple scientific research studies. That amounts to about 1 gallon of 200 ppm hypochlorous acid per 100 gallons of water. Of course, every plant will react slightly differently to chlorine, so we recommend doing a susceptibility test on a few plants before adding HOCl to your entire system. It's difficult to measure ppm that precisely, but there are other markers you can look for, such as ORP (500-600) and pH (5.5-7.5).

CAN HOCI BE ADDED AT THE SAME TIME AS LIQUID NUTRIENTS?

The short answer is no. When hypochlorous comes in contact with nitrogen, it is rapidly converted to chloramine, which is much less effective as a sanitizer. Therefore, it's best to add HOCl separately from nutrients, either on different days (if possible) or at different times of the day. Always test your pH and ORP after adding anything to the water to make sure you're still getting the maximum benefits from free available chlorine. If needed, you can always top up the system with more HOCl.

WILL HOCI GET RID OF FUNGAL GNATS, APHIDS, AND OTHER PESTS?

There is not currently any peer-reviewed research about the efficacy of HOCl against insects and pests. However, pests are often drawn to systems where there is bacteria available for them to feed on (ie; fungal gnats feed on algae and fungi). Keeping your growing system clean with HOCl can put you at less risk of a pest infestation, but we can't guarantee it will be effective against any ongoing infestations. An ounce of prevention is worth a pound of cure!

ON OUR MINDS THIS WEEK

THE CASE FOR ONSITE GENERATION

Nearly every industry uses some form of bottled disinfectant or sanitizer. These bottled products often represent a significant operating cost for each business, particularly for heavy disinfectant users such as healthcare centers, food processors and packagers, and agricultural producers.

Onsite generation undercuts these costs significantly, removing the need to pay for shipping and transport, plastic packaging, and complex chemical production. The production of hypochlorous acid only requires very small amounts of salt, vinegar, and electricity. The amount of electricity needed to power the Hypo is about what it takes to power a lightbulb.

With all these benefits, you might expect onsite generation to be much more expensive than your current cleaning protocols. However, it is 30% cheaper to produce your own HOCl than it is to buy a bottle of bleach.

COUNTRY	AVERAGE COST OF BLEACH	COST OF HOCl
USA	$1.50 / LITER	$0.05 / LITER*
KENYA	$3.09 / LITER	$0.05 / LITER*
SINGAPORE	$1.82 / LITER	$0.05 / LITER*
BRAZIL	$1.22 / LITER	$0.05 / LITER*

*Includes amortized cost of machine assuming 500 ppm batches

BOTTLED HOCl	COST / LITER	HYPO 7.5 HOCl EQUIVALENT*
ATHENA CLEANSE 280 PPM	$18.50	$0.04 / LITER
CLEAR LINE 1500 PPM	$39.63	$0.15 / LITER
NATRASAN 150 PPM	$7.99	$0.04 / LITER

*All cost estimates for HOCl are made using the costs of inputs in the USA

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ANTIBIOTIC AND ANTIMICROBIAL RESISTANCE

Antibiotic resistance is a major concern for healthcare professionals, particularly in regards to the types of cleaning products used in medical settings. Antibiotic resistance refers to the ability of pathogens to develop a resistance to things that would attempt to kill them--similar to a shield of defense. This means it can be extremely difficult to disinfect areas that have been contaminated with antibiotic resistant bacteria. In light of the COVID-19 pandemic, this has become an even greater concern to the medical and scientific community for two reasons: First, the increased use of antimicrobial and biocidal disinfectants could have unintended consequences by increasing bacterial resistance. Secondly, the inappropriate overprescribing of antibiotics may cause further antibiotic resistance.

WHAT IS THE DIFFERENCE?

Antibiotic and antimicrobial resistance are similar but different. Antimicrobial resistance is the response of microbes, fungi, or viruses to solutions meant to kill them. These microbes naturally develop resistance as part of their defense mechanism after repeated exposure to a specific antimicrobial agent. It is important to note that no disinfectant is immune to antimicrobial resistance, although some disinfectants are easier to develop resistance to than others.

Antibiotic resistance occurs after an antibiotic has been used to treat a bacterial infection. Like antimicrobial resistance, this process also occurs slowly and over repeated exposure, but is often caused by human action. The most common causes are the over-prescribing of antibiotics to humans and the pervasive and preventative treatment of animals with antibiotics.

Antimicrobial resistance has been shown to contribute to antibiotic resistance in some cases, as both mechanisms interact with similar genes. However, the level of correlation between antimicrobial and antibiotic resistance is currently unknown.

WHAT ABOUT HYPOCHLOROUS ACID?

While disinfectants can contribute to antimicrobial resistance, they do not cause antibiotic resistance. Some researchers conclude that antimicrobial resistance is inevitable when microbes are exposed to specific disinfectants over an extended period of time. Pathogens, just like all other living organisms, are made to adapt and survive. In particular, the research shows that repeatedly exposing pathogens to low levels of disinfectants (doses that fall below the lethal bactericidal concentration) have been more likely to trigger antimicrobial resistance. It is important to distinguish between the minimum quantity of a disinfectant needed to **inhibit** a pathogen, and the minimum quantity needed to achieve **pathogen death** (eg; 3 Log 10 reduction). In these cases, the research suggests using a disinfectant that can achieve pathogen death quickly and effectively is the best option to avoid the development of microbial resistance.

The research on the correlation between hypochlorous and antimicrobial resistance is still young. It is well-known that oxidizers (such as HOCl) generally cause irreversible damage to bacterial cells. Some studies have shown that HOCl can induce biofilm production in gram negative (non-enveloped) bacteria. Bacteria produce biofilm as an extra layer of protection. This biofilm layer can contain bacterial cells that are 100-1000 times more resistant to antibiotics than the host bacteria. However, there is also substantial scientific evidence showing HOCl's efficacy as a biofilm eliminator.

Only a few bacterial mechanisms that are specific to combatting HOCl have been identified. Researchers have found 3 transcriptional regulators (proteins involved in DNA gene expression) and 4 chaperone holdases (protein protectors) present in bacteria that are specific to combatting HOCl. Salmonella and E. coli have been found to develop a resistance to sodium hypochlorite (bleach). This resistance has been infrequent, and hypochlorite is also known to reduce antibiotic resistant genes by about 1 Log. Some research suggests that higher concentrations of chlorine in wastewater (2-32 mg/L) could decrease the quantity of antibiotic resistant genes accordingly.

In conclusion, there is still much we don't understand about how bacteria defends itself against a disinfectant attack. As tempting as it may be to generalize, or claim that bacteria can never develop a resistance to HOCl, that may not be true. What we do know is that HOCl is the most effective form of chlorine against pathogens, and as a strong oxidizer, is one of the most difficult disinfectants for bacteria to develop a defense response to. And if ineffective disinfection only contributes to bacterial resistance, then using a highly effective disinfectant like HOCl that can quickly inactivate bacteria without harmful health or environmental consequences is one of the best options.

READING LINKS

Antibiotic Resistance to Sodium Hypochlorite

Resistance in Disinfectants

Antibiotic & Antimicrobial Resistance

Bacterial Responses to HOCl

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EMERGING HOCI RESEARCH IN 2022

Even though hypochlorous acid has been widely used for over 100 years, new research continues to teach us more and more about how to use this product. Here is a round-up of some of the most recent peer-reviewed scientific studies involving hypochlorous acid that have been published in the last 6 months.

HOCI AND SOIL REMEDIATION

A study published by the Royal Society of Chemistry tested the effectiveness of HOCl as a soil remediator. Their results showed that HOCl acted as an oxidizer to break down the hydrocarbons, with a reduction of 93.33% after 48 hours.

Soils can become heavily contaminated with carcinogenic compounds, microplastics, and heavy metals due to improper waste disposal or leaching. Because of the need to protect and maximize the use of our existing soils, new research is constantly emerging on ways to remediate soil that has been contaminated so that it can be used for agriculture and prevent further leaching of pollutants into water sources.

This study looked at HOCl's ability to degrade hydrocarbons in the soil. Hydrocarbons are organic compounds that can cause cancer and birth defects in humans and animals, and can be difficult and expensive to remove from soils. The tests were done with sodium hypochlorite at a very high chlorine concentration (1,000-5,000 mg/L). The researchers found that lower pH in soil dosed with high levels of sodium hypochlorite correlated with a higher reduction in hydrocarbons, suggesting that HOCl was the most effective form of chlorine against hydrocarbons. Over 50% of the chlorine was used up within the first hour, which offers some valuable insights into the interaction between soil and HOCl. HOCl can be added to soils as a fungicide or viricide, but the ppm needs to be high and application needs to be frequent to adjust for the rapid chlorine loss.

HOCI AND HPV

Human papillomavirus is a highly contagious sexually-transmitted virus that can lead to various forms of cancer. A recent study in the Journal of Medical Virology tested HOCl as a sterilizer for medical instruments contaminated with HPV. The HOCl concentration was 180 ppm and the results showed that after 15 seconds, all strains of HPV (except HPV 16 on ultrasonic probes) were inactivated to >4 Log reduction (99.99% killed). HPV 16 was reduced to 99.99% after 5 minutes of soaking in HOCl.

This is an exciting discovery in the field of medical disinfection, as the most standard form of sterilization (heat treatment in an autoclave) is not always an option, particularly in developing countries. Using HOCl as a safe and effective sanitizer could help reduce the risk of hospital-related infections.

A COMPARATIVE ANALYSIS OF HOCI AND BLEACH IN NIGERIA

A recent comparative analysis by the London School of Hygiene and Tropical Medicine tested the effectiveness of hypochlorous against hypochlorite in two Nigerian hospitals. They said the following about the results: "We demonstrated that HOCl and NaOCl have a similar efficacy in achieving microbiological cleanliness, with HOCl acting at a lower concentration. With a better safety profile, and potential applicability across many healthcare uses, HOCl provides an attractive and potentially cost-efficient alternative to sodium hypochlorite in low resource settings."

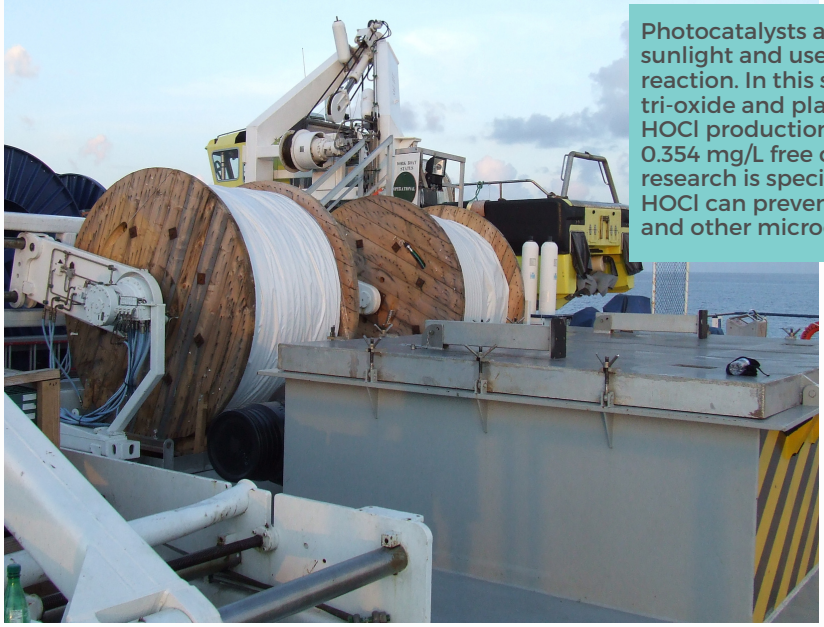
HOCl AS A POTENTIAL COMPONENT IN CANCER IMMUNOTHERAPY

Cancer immunotherapy treatments often rely on cancer cell-derived secretions (CDS) to help induce an immune attack against tumor cells. These secretions are created by placing the cells in a treatment (eg; culture) that stimulates them to produce an immune response. A recent study by the Huazhong University of Science and Technology tested a variety of products for CDS culturing, including hypochlorous acid. The CDS derivatives cultured in HOCl showed the strongest anti-tumor response, impairing tumor growth and extending the lives of mice with melanoma cancer.

COLD FOGGING WITH HOCl ACHIEVES >6 LOG REDUCTION

A recent study by Stony Brook University tested the ability of HOCl to inactivate Enterococcus faecalis with a ULV cold fogger. The study found that HOCl could reduce the presence of E. faecalis on plastic and metal surfaces by 6 Log (99.9999%) within 5 minutes of fogging. This itself isn't a revelation, as the efficacy of HOCl on surfaces has been proven many times. However, the interesting part of this study was in the details. This study was partially funded by EcoLogic, a company that sells both bottled HOCl and HOCl generators. The study included a comparison of commercial HOCl and "homemade" HOCl (made in a small generator). They tested the stability of each solution and found that the homemade HOCl lost 65% of its chlorine content after 100 days of storage, compared to 35% in the commercial solution. This shows that commercial HOCl may offer up to 50% greater stability compared to homemade HOCl, but still begins to lose its strength after only 100 days. The way we look at it, even 50 days is more than enough storage time for a bottle of homemade HOCl before needing to make another batch. And unlike the commercial solutions, you're saving money every time you make another batch.

HOCl SYNTHESIS THROUGH PHOTOCATALYSIS IN SEAWATER



Photocatalysts are materials that capture ambient sunlight and use that energy to induce a chemical reaction. In this study, Chinese researchers used tungsten tri-oxide and platinum microspheres as a photocatalyst for HOCl production in seawater. They were able to produce 0.354 mg/L free chlorine each hour using this method. This research is specific to the context of marine equipment, as HOCl can prevent marine equipment from algae build-up and other microorganisms that would foul the equipment.

Interested in reading more peer-reviewed research studies about HOCl? Check out the Research Library on our website! Click the link below to visit:

https://hyposource.com/pages/research-library

READING LINKS

HOCl and Cancer Immunotherapy

HOCl vs Hypochlorite in African Hospitals

Testing the efficacy of HOCl via ULV foggers

Photocatalyst HOCl production

HOCl and HPV

HOCl as a soil remediator

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KENYA BUREAU OF STANDARDS (KEBS) TEST RESULTS

During Hypo Source's recent exhibition at the Christian Health Association of Kenya, we completed the process of getting the hypochlorous acid produced by the Hypo 7.5 approved by the Kenyan Bureau of Standards (KEBS). KEBS validates and certifies the claims of Kenyan companies, proving that their products are actually valid. This is particularly important in the disinfectant and medical products industry, as it serves to protect the end user. Gaining a certification from KEBS establishes validity as a distributor in the market and helps gain the trust of customers.

So, while Hypo Source was exhibiting at the CHAK conference, Lincoln and Irene made a batch of 500 ppm hypochlorous using the cheapest salt and vinegar that they could find at the local Quick Mart. In fact, the vinegar was so cheap that it was labeled as "imitation vinegar" because it was actually acetic acid. The water was sourced from the tap in the kitchen at the conference hotel. They chose the ingredients this way to replicate sources that would be within the reach of any Kenyan who was using the Hypo. Remember that the Hypo is the most rugged and simple hypochlorous machine on the market and it was designed for real field work (like in hospitals and clinics in Kenya). That's why the solution we submitted for the KEBS test was made in real world conditions with low-cost, accessible ingredients. We even poured it into recycled water bottles, tearing off the old labels and replacing them with Hypo labels.

SAMPLES OF HYPOCHLOROUS READY TO GO TO KEBS FOR TESTING!

QUICKMART VAIYAKIVAY
QUICK MART LTD.
P.O. Box 2361 00621, Village Market.
CASH SALE
VAT Reg: 01267530 Pin No. P051188806D
Date: 11:41am Tue 26 April 2022

Item	Qty	Each	Total
FD-TRU ZESTA WHITE VINEGAR 700ML 420476	1.000 PCS	99.00	99.00 G
FD-KENSALT 500G 510120	1.000 PCS	20.00	20.00 G

TOTAL : 119.00
CASH PAID : 200.00
CHANGE : 81.00

Total Qty : 2.00 units
Cashier : VALERIE MANJA
Supervisor: LILIAN MUTHONI MAINA

CODE	PRE-VAT	VAT	TOTAL
A - 16.000	102.59	16.41	119.00
TOTALS	102.59	16.41	119.00

FOR HOME DELIVERY
CALL: 0110003003:
0110003004
E&OE

Receipt for the hypochlorous ingredients in Nairobi; 119 Kenyan shillings is equal to about $1.02 USD.

The KEBS test we applied for was the KS 929 test, which is the Kenyan equivalent of the EN 1276 test for chemical disinfectants and antiseptics. It measures the bactericidal and antimicrobial activity of the disinfectant. A 4 Log kill rate would be a great result on this test. What was the result using our real-world sample of 500 ppm hypochlorous? We achieved a 7.5 Log reduction (99.99999%) in the pathogens tested! That's the equivalent of 1 in 10 million pathogens surviving! A 7.5 Log reduction is exceptionally high–that's over three times what most laboratories would require to be considered a "pass."

We are excited that this experience proves the Hypo 7.5's durability and international suitability. Unlike other hypochlorous acid generators, the Hypo doesn't need specially filtered water or high-quality ingredients to produce an effective and reliable disinfectant. It is rugged, simple, and affordable – and now we have proof that it is highly effective in real world conditions.

Kenya Bureau of Standards
Standards for Quality life

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Laboratory Test Report

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PRIVATE SAMPLE

REPORT UID: 20220512115045/1
KEBS Sample Ref. No: 4520221186
Date : 12 May, 2022
1. Description of Sample: HYPOCHLOROUS ACID
2. Sample Submitted by: HYPO LTD
3. Customer Contact: HYPO LTD
4. Customers Ref No: KEBS/HQ/TES/PRIVATE
5. Customer's Address: KENYA
6. Lab Ref: KEBS/TES/MIC-NAR/M/22
7. Date of Receipt: 4 May, 2022
8. Date Analysis Started: 4 May, 2022
9. Sample Submission Form No: 280324
10. Additional information provided by the customer:
500 PPM

11. Acceptance criteria-title and number of specification against which it is tested:
KS 929: 2016 KENYA STANDARD Chemical disinfectants and antiseptics - Quantitative suspension test for the evaluation of bactericidal activity of chemical disinfectants and antiseptics - Test method and requirements

12. Parameters tested and Method(s) of test: as listed in the report below:

LABORATORY TEST REPORT

No.	Parameters	Results	Requirements	Test Method No.	LOD
1.	Antimicrobial Value	Log reduction 7.5	Min	KS03-929	

CAUTION: This report refers to a privately submitted sample and all details in respect of the source and test results of similar products are not verified or confirmed

COMMENTS/REMARKS:
The sample performed as shown

KUBENDE ROSE - LABORATORY ANALYST
FOR: MANAGING DIRECTOR

12 May, 2022
Date of Issue

The results contained herein apply only to the particular sample(s) tested whose sample submission form serial number is herein quoted, and to the specific tests carried out, as detailed in this Test Report. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Managing Director, KENYA BUREAU OF STANDARDS. If undelivered, please return to the address written above.

This is a copy of the KEBS report. Yes, believe it or not we did actually achieve a 7.5 reduction with the Hypo 7.5! Talk about serendipity!

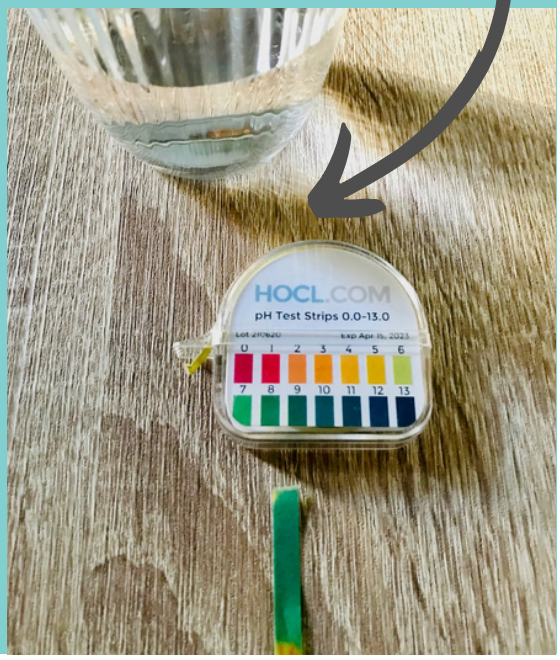
As you can see from this photo, the water at my house is quite alkaline. Whenever you are testing pH, it's important to wait about 30 seconds for the color on the strip to fully develop.

ARE YOU TESTING YOUR SOURCE WATER?

We always talk about testing the pH of your HOCl before using it, but testing the pH of your source water is equally important. The water you're using is the main ingredient in the HOCl, and thus will have a significant effect on the composition of the final solution.

Case in point: I recently moved to a new country, and was excited to start making my own HOCl at home with my Eco One. I followed the instructions for a batch of 200 ppm as per usual, but noticed that my HOCl smelled very strongly of chlorine. I checked the pH and it was around 7, which is still considered within the safe range for HOCl, albeit right at the upper limit.

At first, I couldn't figure out why my HOCl suddenly smelled like bleach and worried that the Eco One had been damaged in shipping. But then I remembered that I hadn't checked the original pH of my tap water. Sure enough, that was the culprit! My tap water is between 8-9 pH, which is quite alkaline. From now on, I know that when I make HOCl I need to add an extra teaspoon of vinegar to help drop the pH into that 5-6 sweet spot.



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PARTNER SPOTLIGHT: MAYIN WATER

Mayin Water has become Zimbabwe's hypochlorous acid champion, thanks to the drive and dedication of Dr. Taurai Imbayarwo. In 2019, after years of living abroad and working in numerous universities, Imbayarwo returned to his home country of Zimbabwe to open a company focused on hypochlorous generation technology--Mayin Water. Mayin Water (which Imbayarwo says means "rain water") started out as a distributor of machines to produce hypochlorous acid on site. However, the public reception for the technology was slow, and Imbayarwo saw a better business opportunity in starting off as a hypochlorous acid bottler.

Dr. Taurai Imbayarwo

With this idea, he struck gold. He began marketing bottled hypochlorous under the brand name "Ano-Care". He primarily targeted poultry farmers, who make up a large percentage of the agriculture industry in Zimbabwe. Imbayarwo initially gave away free bottles of hypochlorous to the farmers, encouraging them to wait and see the results before committing to purchase. It didn't take long before famers were hooked, and word spread quickly. Hypochlorous reduced bird mortality rate, improved weight gain, and helped reduce worms, eye diseases, and diarrhoea.

BaVi Kill, Ano-Care's HOCl product for poultry. It can be dosed into the drinking water, applied to wounds, and fogged in the chicken houses.

Imbayarwo didn't stop at poultry. Seeing the success his bottled poultry product was having, he moved on to launch products for pig care, cattle care, horticulture, wound treatment, skincare, and water treatment. Though initially there were many roadblocks to overcome in introducing hypochlorous acid to the country, Mayin Water has now become a respected industry leader. The company has prospects on the horizon to work with the Ministry of Veterinary Services and bring hypochlorous throughout the country for the porcine, bovine, poultry, and horticultural industries. Mayin Water has also partnered with Zimbabwe's Pig Industry Board to increase research on the benefits of hypochlorous acid with the aim of reducing pharmaceutical imports into the country.

The positive results farmers are seeing has been the main driver for Mayin Water's success, with word-of-mouth being the most powerful marketing strategy. "People are happy because with this product, they have been able to stop buying pharmaceuticals, antibiotics and vaccinations," Imbayarwo said. "We have followers who can't live without hypochlorous now - they are using it for everything!"

With his own chicken project, Imbayarwo uses hypochlorous acid and has seen a jump in broiler maturity from 6 to 4 weeks. From a business perspective, this is an all-around win--less money spent on food and antibiotics equals a higher profit.

Of course, this kind of success also attracts competition. But Mayin Water continues to stay one step ahead, making sure their products pass the highest levels of testing and receive the necessary approvals from the government.

As a business, it has taken time to educate people about the product and its broad-spectrum applications," Imbayarwo said. "People are used to things that choke the life out of microbes, that are extremely concentrated with a very strong smell. At first, they don't believe that something that looks like water will work."

Though the process of education has been slow, it has paved the path for Mayin Water to introduce their loyal customer base to the next step up--making their own hypochlorous onsite. "At first, nobody wants to invest their money in an expensive hypochlorous machine," Imbayarwo said. "With the bottled product, you see results in a short period of time. Once people begin to like the product, they are able to consider the cost-benefits. It all comes full circle, but you have to start with small bites."

As both a bottler and a distributor of hypochlorous machines, Mayin Water is perfectly poised to meet their customers where they are, whether they're ready to buy a machine of their own, rent a machine for a few months, or stick with the bottled products. Imbayarwo plans to use a leasing model for the Hypo 7.5 machines for now, focusing on places like remote hospitals that are already spending hundreds of dollars per month on disinfectants.

The full line of Ano-Care products. Cattle Boost is being used to prevent tick disease, boost the animal's immune system, and prevent mastitis. Wound Buster is targeted towards hospitals for use as an antiseptic bio-solution. Fresh Greens is an all-purpose horticulture solution for application during the growing and harvesting stages. Runako is marketed as a skin topical and acne/eczema treatment. Bump-Clear is similarly marketed as a male aftershave product.

Imbayarwo sees great potential for the future of hypochlorous acid in the region. "In southern Africa, where there are primarily agro-based economies, hypochlorous is going to take off. People want to reduce their farming costs, mainly by reducing pharmaceuticals and fertilizers. Hypochlorous can reduce the cost of doing business from farm to fork."

Future plans for Mayin Water include building out the market for water treatment, the health sector, hospitality, and manufacturing industries. According to Imbayarwo, Zimbabwe imports millions of dollars of water treatment chemicals each year, most of which could be replaced by hypochlorous produced in-situ. Imbayarwo sees hypochlorous as an answer to the poor quality of drinking water that plagues many parts of the country. Mayin Water donates bottles of hypochlorous to neighbourhoods where there are problems with water contamination.

And of course, as part of being in a growing industry, the obligation to educate others never stops. Mayin Water is partnering with the Women's University in Africa to conduct research trials on hypochlorous and has introduced hypochlorous to the Medical Control Authority of Zimbabwe. Educating people and building a strong portfolio of sound scientific research takes time, but it is opening the doors for Mayin Water. The company just secured a deal with one of the country's largest distributors, which will begin stocking Ano-Care products in their stores this week. The success of Mayin Water in Zimbabwe is testament to the fact that hypochlorous acid does have the potential to become a mainstream product anywhere there is an industry with a need.

HYPO SOURCE
ON-SITE DISINFECTANT GENERATION
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THE CLEAN HYPE

THE ARGUMENT FOR ONSITE GENERATION

Hypochlorous acid is readily available for purchase online in bottled form--so why bother making your own? In this article, we break down the top four reasons for generating hypochlorous acid onsite at your home or business. We encourage you to do the math for yourself to figure out how much money you could save if you switched to onsite generation.

FLEXIBILITY IN QUANTITY + AVAILABILITY

One of the best parts of having your own machine is that you can make as much hypochlorous as you want, whenever you need it. The cost to make a liter of hypochlorous is quite literally pennies, and it's ready in about the amount of time it will take you to read this post. You never have to worry about running out and being unprepared. Plus, this method also means less CO2 emissions from shipping transport and less single-use plastic disinfectant bottles getting added to the landfill (or ocean).

CONTROL OVER INPUTS + QUALITY

When you purchase bottled hypochlorous acid, you don't know what's actually inside the bottle. Some manufacturers add additional ingredients to act as a stabilizer, or may advertise a higher free available chlorine content than what they're actually selling. With your own machine, you get to control the type of salt and water you use, as well as the chlorine strength you make. Every Hypo 7.5 comes with pH and chlorine test strips so you can confirm that the solution you're making is hypochlorous acid.

REDUCED SUPPLY CHAIN DEPENDENCE

No one likes waiting on a package to arrive, but it's even worse if it never shows up. Supply chain delays can be caused by climate events, political unrest, global pandemics, miscommunication, and so much more. A delayed disinfectant shipment might mean a loss of revenue for your business or a disease outbreak at a critical time. Owning your own machine gives you peace of mind and self-sufficiency. Never wait on a delivery truck again!

MASSIVE COST SAVINGS

We definitely saved the best for last! The amount of money you can save by switching to onsite generation is stunning. The ingredients for hypochlorous are universally cheap--only salt, water, and a bit of vinegar. On average, it costs about $0.09 per gallon to make 200 ppm hypochlorous acid (including the amortized cost of the machine). Making 2 gallons of 200 ppm hypochlorous in the Hypo 7.5 is over 350 times cheaper than purchasing the same amount of bottled hypochlorous online (without the shipping costs included)!

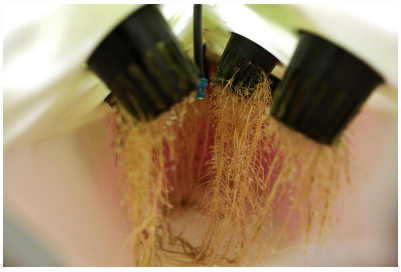
HOCl IN AEROPONICS

Aeroponics is a form of soilless growing that relies on regular delivery of a nutrient-rich water solution onto the bare roots of plants. Most aeroponic systems use misters with a very fine droplet size, either with a high or low pressure pump. Similar to hydroponics, aeroponics are most commonly used in controlled environment agriculture settings, such as vertical farms and greenhouses. And just as hypochlorous is very useful in hydroponics, it is equally (or perhaps, more) applicable for aeroponics. These systems are highly susceptible to failure as a result of clogged water lines, algae build-up or disease outbreak. Thankfully, hypochlorous exists to tackle all of these challenges simultaneously!

HOW IT WORKS

Plants are grown in either an inert foam plug or directly inside netted pots. The plants are placed above a mister that regularly delivers nutrients and water in a fine mist, keeping the plant roots moist and alive. In order to prevent algae growth, these systems are typically sealed off (with the exception of inlets for oxygen), so that the roots do not ever receive direct sunlight or exposure to the outside elements--just as if they were in soil.

The direct application of a tailor-made nutrient cocktail to the plant roots, coupled with 24-hour ideal climate conditions, results in much higher yields than traditional agriculture. However, aeroponics also comes with a substantial risk of failure. If one part of the system fails, or there is a power outage, the plants cannot survive on their own. Because of this, it's more important than ever that growers keep their system as clean and well-functioning as possible. That's where hypochlorous acid comes in! Here are just a few of the ways that owning an onsite hypochlorous acid generator can benefit an aeroponic farmer.



PREVENT MISTER BLOCKAGES

Hypochlorous acid works very well as a preventer and eliminator of biofilm, algae, and mineral buildup. Because it is also safe for plants, it can be dosed directly into the watering system and run at a constant, low dose to prevent anything from forming that would stop the misters from functioning.

SANITIZE GROW PLUGS

Sterile grow plugs are an essential part of keeping an aeroponic system healthy. Before planting, these plugs (or net baskets) can be soaked in hypochlorous acid to kill any hidden viruses or fungal pathogens.

KEEP THE GROW ROOM CLEAN

Part of a clean growing environment is ensuring the workers aren't bringing in pathogens with them. Hypochlorous is non-toxic and skin-safe, which means it can easily be used as a boot dip, hand and clothing wash before and after entering the grow room.

READING LINKS

Background on aeroponics

HOCl as a fungicide

Methodology for adding HOCl to an aeroponic system

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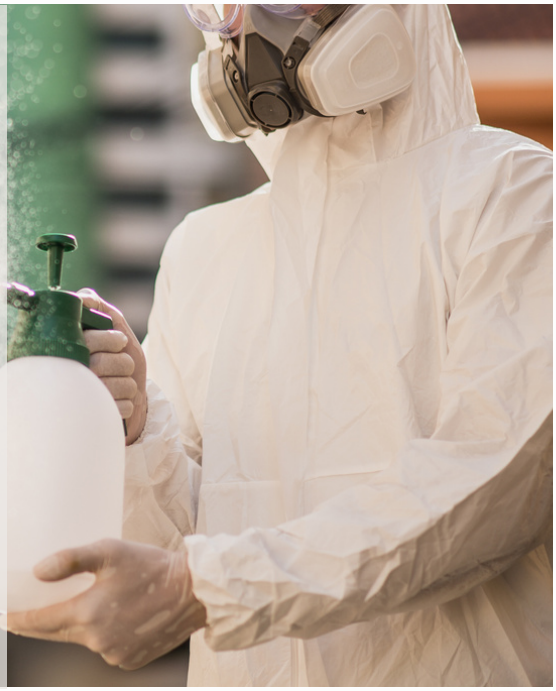
VOLUME 29

IS HYPOCHLOROUS ACID EFFECTIVE AGAINST MONKEYPOX?

Monkeypox is a rare disease caused by infection with the monkeyvirus. It is primarily spread through close contact with infected bodily fluids or lesions, though it can also be spread through touching infected surfaces or objects. Monkeyvirus is an enveloped virus, which means it is easier to disinfect because it is surrounded by a protein shell that can be easily dismantled by temperature and pH, exposing the virus inside to the lethal power of the disinfectant. The protein shell also contains the infectious components of the virus, so once the disinfectant has broken down the shell, the virus is unable to reproduce.

The good news is that enveloped viruses are some of the easiest to inactivate with disinfectants. Oxidizing agents (such as hypochlorous acid) have been proven to be the most effective at inactivating enveloped viruses. There are currently 29 hypochlorous acid products listed on the EPA's list of disinfectants for emerging viral pathogens (which includes monkeypox). This list requires the disinfectant manufacturers to provide proof of disinfectant efficacy prior to being added to the list.



Because monkeypox is an emerging public health concern, there are not currently many peer-reviewed scientific studies on the efficacy of disinfectants against this virus. However, as was the situation with coronavirus, it is likely there will be many studies forthcoming in the following months, and this post will be updated accordingly.

The majority of existing disinfectant research has been done on orthopox and vaccinia viruses, the family of viruses of which monkeypox is a part. A review published this month by Kampf in the Journal of Hospital Infection found that sodium hypochlorite bleach (a less effective form of chlorine) was effective against vaccinia viruses on contaminated surfaces at 0.525% (500ppm) in three minutes (2022).

Other studies have found sodium hypochlorite is effective against surfaces contaminated with vaccinia viruses at 0.25% (250 ppm) and 2.5% (2,500 ppm) with one minute contact time. As hypochlorous acid is the active disinfecting ingredient in sodium hypochlorite, it can be concluded that hypochlorous at the same strength would be equally as effective.

Hypochlorous acid is a strong oxidizer that is non-toxic and effective on porous and non-porous surfaces. It can be produced onsite at your home or business with an electrolysis machine using only water, salt, and vinegar, and has been proven to be 85 times more effective than bleach at inactivating pathogens. It has proven efficacy against SARS Covid-19 at <100 ppm in under 1 minute.

Until more research is published on the inactivation requirements of monkeypox, we cannot make any claims about hypochlorous acid. This is a report of what we do know at this time; use this information at your own discretion.

HYPOCHLOROUS BY ANY OTHER NAME

Hypochlorous acid has been around for as long as humans have been on the earth and has been used as a disinfectant for over 150 years, but it's not always referred to by that name. The many different names for hypochlorous acid reflect its chemical composition, method of preparation, and functions. It's important to understand the different names for hypochlorous acid, particularly when reading the available scientific literature, as different researchers refer to hypochlorous by different names.

There are certain characteristics you can use as clues to distinguish if something is referring to hypochlorous acid. For example, they may describe the electrolysis of a saline water solution, or talk about an electrically-active solution in a neutral pH range. Other indicators include references to chlorine, such as acidification of hypochlorite or neutralization/dilution of pure chlorine. Keep an eye out for terms like "non-toxic" or "natural disinfectant", as these will usually coincide with a description about hypochlorous acid.

ELECTROLYZED WATER

This term is most commonly used in scientific literature, particularly for agriculture studies. You can also find it referred to as "slightly acidic electrolyzed water (SAEW)" or 'neutral electrolyzed water" (NEW).

HYDROGEN HYPOCHLORITE

This name is very uncommon, but is based on the production of hydrogen during the electrolysis process of chlorine.

HCIO OR CIHO

These are just other ways of writing the chemical formula for hypochlorous,

ELECTROCHEMICALLY ACTIVATED WATER

This is often abbreviated to "ECA water", however it's important to check the fine print as this name can refer to other solutions that are not hypochlorous (eg; Kangen water).

ANOLYTE

This name is based on the use of anodes in an electrolysis cell to produce hypochlorous acid. The anode produces an acidic or neutral solution, while the cathode, which is opposite the anode, produces a solution similar to bleach, with an alkaline pH.

CHLORANOL

Another uncommon name, but used by some hypochlorous manufacturers to set themselves apart.

So why do we use hypochlorous acid? We chose to stick with the term 'hypochlorous acid' or HOCl because it is the chemical denomination with clearly defined qualities and parameters. When you search hypochlorous acid, the definition is pretty much universally standard. There's not much room left for interpretation, which we value as a company that centers itself on fact-based principles and research.

READING LINKS

EPA Disinfectant List

Vaccinia virus disinfection study

Monkeypox disinfection review

Different names for hypochlorous acid