

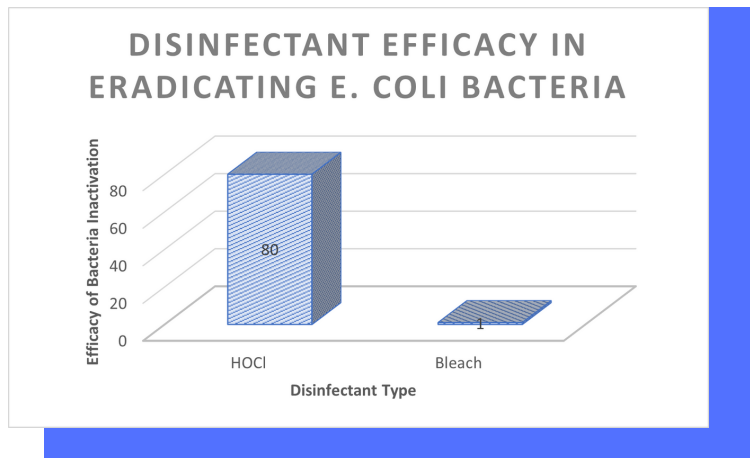
HYPOCHLOROUS VS BLEACH

Which is better?

WHY HYPOCHLOROUS?

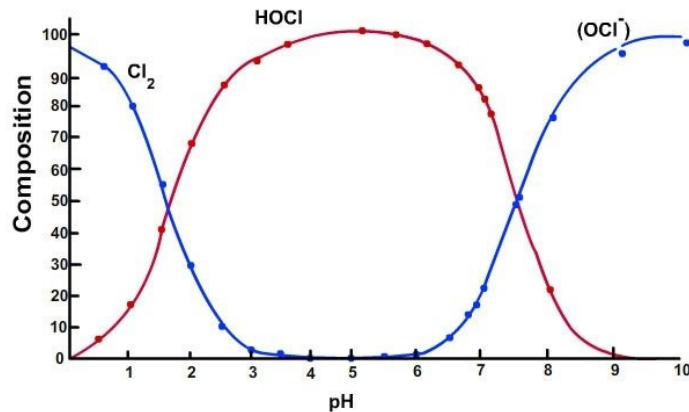
Hypochlorous acid is a non-toxic chlorine-based disinfectant. It belongs to the same family as bleach (hypochlorite), but exists at a lower pH (5-7). The germ-killing properties of bleach are derived from the presence of hypochlorous acid. However, because bleach resides at a high pH (8-13), the majority of the hypochlorous acid is converted to bleach, which is a **less effective disinfectant**.

White's Handbook of Chlorination states, "[Hypochlorous] is overall the most effective disinfectant of the chlorine species present in dilute solution at the pH values associated with water and wastewater treatment. The OCl⁻ ion [bleach] is a relatively poor disinfectant because of its inability to diffuse through the cell walls of microorganisms."



HYPOCHLOROUS ACID	BLEACH
<p>LESS CORROSIVE Hypochlorous is less corrosive than bleach due to its lower chlorine & salt concentration</p>	<p>HIGHLY CORROSIVE Corrosive to equipment, water lines, & living organisms</p>
<p>SAFE FOR SKIN Can be safely applied to soft tissues, wounds, eyes, oral sores, & baby skin</p>	<p>SKIN IRRITANT Harmful with direct skin contact</p>
<p>MORE STABLE Hypochlorous does not need to be diluted & can last for 2-4 weeks in a cool, dark place</p>	<p>LESS STABLE Diluted bleach loses its efficacy after 24 hours</p>
<p>NON-TOXIC Safe for ingestion, leave-on food sanitizer, & cold-fogging</p>	<p>HIGHLY TOXIC Ingestion will result in fatality or severe harm</p>
<p>BIOFILM ELIMINATOR Hypochlorous effectively reduces organic biofilm & mineral build-up in water lines</p>	<p>SENSITIVE TO ORGANIC MATTER The presence of organic matter greatly reduces bleach's efficacy</p>
<p>NEUTRALLY CHARGED Hypochlorous is neutrally charged, which allows it to invade negatively charged pathogens & destroy them from the inside</p>	<p>NEGATIVELY CHARGED Pathogens & bleach are negatively charged. Bleach repels pathogens like two magnets forced against each other.</p>
<p>NO STAIN OR SMELL Hypochlorous won't bleach clothes & eliminates odors</p>	<p>STAINS FABRIC + SMELLS BAD Bleaches clothing & has an overwhelming chemical smell</p>

THE ROLE OF pH



The pH of a chlorine solution is crucial in determining its efficacy. At pH 5-6, the solution will be nearly 100% hypochlorous acid. As the pH increases above 6, hypochlorite (bleach) begins to increase.

Because hypochlorous dominates at a low pH, chlorination provides more effective disinfection at low pH. At a high pH, OCl⁻ (bleach) dominates, which causes a decrease in disinfection efficiency.

According to a review of disinfectants published in [View Research Journal in 2020](#), hypochlorous acid is considered one of the most effective disinfectants against small non-enveloped viruses. Non-enveloped viruses such as adenovirus and poliovirus are some of the most difficult viruses to kill.

The study compared bleach, alcohols, quaternary compounds, and other disinfectants. They found that the high pH level of bleach made chlorine less effective as a disinfectant. At a near-neutral pH, hypochlorous acid had the highest inactivation power against viruses.

Hypochlorous acid kills pathogens in a more effective way because it is the same process our own white blood cells use. This process, known as phagocytosis, allows the hypochlorous molecule to move through the cell wall of the pathogen via osmosis. Once hypochlorous acid is within the viral cell, it can dismantle and inactivate the pathogen.

Bleach is less effective than hypochlorous because the germicidal properties of bleach are derived from the presence of hypochlorous acid in the solution. As the pH rises, the germicidal/viricidal/fungicidal properties of the solution decrease in efficacy.

References

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