Advancements in Safe, Effective and Durable Long Lasting Disinfectants

A New Generation of Quaternary Compound Solution from Florida

Abstract:

This whitepaper explores the groundbreaking development of a new Quaternary disinfectant that works better, is safer for humans and the planet, has a very low carbon footprint and is manufactured in Palmetto, Florida. The product, "STIZE Disinfectant" (EPA Registration 100629-2), is positioned as a superior alternative to traditional multi-quaternary, alcohol, peroxide and bleach-based alternatives. The unique formulation, derived from extensive research and development, and benefiting from a patented, non-leaching binder, offers unparalleled efficacy, biosafety, and environmental suitability.

1. Introduction:

The global demand for effective disinfectants has grown significantly in light of public health challenges of the last few years. Traditional disinfectants, such as multi-quaternary compounds (and those with ethanol enhancement); isopropyl and ethanol (alcohol's); and bleach (Hypochlorous Acid)-based solutions, have been widely used but also present undesirable consequences[1]. Among which are high levels of toxicity for humans, animals and plants; long term accumulation in sensitive ecosystems and the inevitability of continually diminishing efficacy due to Antimicrobial Resistance (AMR) from overuse and pathogenic adaptation. An innovative alternative is thus very desirable.

2. Development of an Advanced Quaternary and Water-Based Disinfectant:

The novel STIZE disinfectant originates from cutting-edge research conducted in Florida. The formulation relies on high-purity (USP grade) water, a single, high concentration (1.5%) quaternary compound (Didecyldimethylammonium Chloride-DDAC) and a proprietary binder. DDAC was selected and formulated for its broad-spectrum, maximum antiseptic/disinfectant activity as well as ability to retain a high ionic (positive) charge. At this concentration of DDAC, STIZE is also classified as a hospital level (highest) disinfectant due to its ability to kill gram positive and gram negative bacteria, viruses such as SARS CoV2 and Norovirus as well as fungi, yeasts and molds. Equally, at this concentration, STIZE is classified as a deodorizer and surface cleaner – rendering it far outside of the norm of most disinfectants that require surfaces to be pre-cleaned before application.

Another major problem with all disinfectants is that they only work while the active ingredient remains viable (often only a few seconds due to evaporation, dilution, or interaction with the diluting agent itself). While these disinfectants certainly can kill microbes (presuming instructions have been followed and in most cases the surface to be treated has been cleaned by another product to first remove visible contamination), they do not prevent additional airborne or environmentally distributed microorganisms from infecting/re-contaminating these same areas shortly after cleaning. As a result, these surfaces would need to be continually cleaned to prevent ongoing microbial growth, hence needing additional use of disinfectant quantities, and leading to increased human and environmental chemical exposure.

3. Advantages Over Multi-Quaternary Compounds:

- Enhanced Efficacy: STIZE exhibits a broader spectrum of antimicrobial activity due to its relatively high DDAC concentration (1.5%). Moreover, STIZE has been proven to sustain its high efficacy even on dirty surfaces that normally need to be cleaned before the application of disinfectant.
- Reduced Toxicity: Unlike some multi-quaternary compounds, STIZE was designed from the ground-up to be less toxic to humans animals and the environment, and non-leaching (to stay on the desired surface and not become runoff), all while minimizing health risks.
- Many multi-quat competitors rely on ethanol boosting to achieve broad spectrum pathogenic kill efficacy thus defeating a key advantage of quats (lower toxicity)
- Durability: With its high purity water formulation and high positive ionic charge, STIZE adheres very well to most surfaces (negatively charged) and more effectively attracts inherently negatively charged pathogens (virtually all). This combination has shown high initial pathogenic load knockdown, ongoing protection once the water has evaporated and no further dissipation or leaching as with most multi-quats lacking a binder.
- Absent an effective binder, most quats can easily be rinsed away and enter the ground/water ecosystem. Toxicity to some marine life has been shown to exist with many quats when not bonded to a surface.

4. Advantages Over Alcohol-Based Disinfectants:

- Prolonged Residual Activity: The water-based disinfectant provides a longer-lasting effect compared to alcohol-based solutions as these evaporate rapidly at ambient temperatures and require near continuous re-application if pathogens can be transferred mechanically or airborne circulation is possible in an open-air disinfection scenario.
- Flammability: Alcohol-based disinfectants are inherently flammable. Alcohol flames are particularly dangerous because they are clear and difficult to see. Made with 97.5% water, STIZE can be used to put out fires.
- Dermal Absorption: Alcohol is very prone to dermal absorption and has shown long term degradation of immune systems and organ damage. By contrast, STIZE's use of DDAC has proven in extensive laboratory dermal toxicity ex-vivo tests that it has very low absorption characterisitcs[2].

5. Advantages Over Peroxide and Bleach-Based Disinfectants:

- Safety: Toxicity from peroxide and bleach-based disinfectants arises from the corrosive activity upon contact with mucous membranes and skin. While small accidental ingestions are very unlikely to cause clinically significant toxicity, large ingestions may cause corrosive gastrointestinal injury and systemic effects, including shortness of breath leading to metabolic acidosis, hypernatremia, and hyperchloremia[3]. If the bleach compound is mixed with other agents and allowed to release chlorine gas, inhalation damage to the respiratory tract, including the airways and distal lung the result can lead acute lung injury or death[4].
- Environmental Friendliness: Comprised of > 97.5% highly purified water, the total active ingredient load in STIZE is inherently low at 1.5%. By contrast, products featuring bleach as the active agent, often have concentrations of >5%. When combined with the binding technology preventing it from leaching, the resultant environmental impact results in orders of magnitude improvements over chlorine-based disinfectants.

- Corrosiveness, Stability and Compatibility: Bleach formulations demonstrate discoloration, high surface degradation on metallic and many plastic surfaces. Suitability for use around these structures and equipment is very limited. Exposure to sunlight, long term stability and releasing of gases when shaken dictate that most products be packaged in opaque, non-bio friendly.
- packaging. STIZE is packaged in recycled, clear packaging and is neither sunlight sensitive nor temperature/vibration unstable.

6. Other Advantages

- It is common for alcohol, bleach and ethanol-enhanced quat-based agents to become less effective over repeated use due to microbial resistance. This can result in the creation of more dangerous infectious agents than the ones originally targeted for destruction. One such example is bacteria Methicillin-Resistant Staphylococcus Aureus, commonly known as MRSA. Traditional treatments are not always effective against so-called “superbugs” such as MRSA. STIZE is not linked to the promotion of microbial resistance, specifically Pseudomonas sp (a very hazardous gram-negative bacteria).[5] By rotating STIZE into a disinfection protocol in which the active agent is fundamentally different every 3-6 months ensures microbial resistance remains contained.
- STIZE has passed rigorous FAA Aviation specified ASTM standards for metals corrosion and can be used on sensitive steel, aluminum, tungsten and other alloys with damaging them.
- STIZE has been certified by the National Food Safety (NSF) organization at the D1 level – enabling its application to food handling surfaces when applied per instructions. Assisted by its proprietary binder, even after rinsing with potable water, a molecular layer of STIZE will remain on a surface and continue to provide advanced, highly effective disinfection.

7. Made in Palmetto, Florida

The manufacturing of STIZE occurs in a state-of-the-art manufacturing plant in Florida. Designed to minimize equipment and product movement, the plant operates at very high efficiency while eliminating the high carbon footprint of transoceanic transit of the vast majority of competitive products. By serving local Floridian markets directly, the product can be rapidly dispatched and replenished. Packaging ranges from an 18mL credit card form factor to 32oz, 1 gallon and 1 ton (256 gallon) bulk containers.

8. Conclusion

STIZE, the advanced water-based disinfectant with a patented binder and single quaternary compound represents a significant leap forward in the field of disinfection technology. Its superior efficacy, reduced toxicity, environmental sustainability, and compliance with safety standards position it as a groundbreaking solution in the fight against pathogens. As industries and individuals alike seek effective, safe, and sustainable disinfection methods, this innovative product from Florida stands at the forefront of the next generation of disinfectants.

9. References

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