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Technical Bulletin: Quat-Based Disinfectants

What's in Your Disinfectant?
An Introduction to Quat-Based Disinfectants

Quaternary ammonium compounds (quat-based) disinfectants have been used in a wide range of applications for over 30 years. The EPA reviews and approves all formulations for safety and efficacy. Quat-based disinfectants are commonly used for sanitizing and disinfecting hard, non-porous surfaces such as countertops, floors, walls, toilets, and fixtures found in hospitals, schools, retail outlets, offices, and many other locations. They are also used in food-service environments for disinfecting and sanitizing surfaces found in commercial kitchens and food processing facilities.

Quat-based formulations can be designed as broad-spectrum disinfectants to protect against traditional and emerging diseases. Commercial quat-based disinfectants are available in ready-to-use sprays, concentrates, and aerosols. Concentrates are a commonly used format for commercial businesses, because they are typically economical and have good efficacy.

How do quat-based disinfectants work?

A quat's positive charge helps it adhere to bacteria, viruses, and other disease-causing microorganisms (all of which have a negative charge). This disrupts the germ's cell walls and leads to its destruction. Quats need to be in contact with the surface being disinfected or sanitized for a specific period of time to completely destroy all of the microorganisms that are present on the surface. Time varies by product and method of application, so always check product labels for proper use instructions.

Quats destroy microorganisms that cause disease. As a group, quats are highly effective in controlling a broad spectrum of germs including bacteria, molds, fungi, and most viruses.

Why use quat-based disinfectants?

Quats are excellent antimicrobial agents. By themselves, they are odorless, non-staining, and non-corrosive to metals when used according to directions. They effectively kill bacteria, viruses, molds, and fungi on hard, non-porous surfaces. Commercial formulations are often used to kill germs that can cause disease in hospitals, restaurants, schools, and offices.

Consumer products used to disinfect the kitchen, bathroom and other rooms of the home also contain quats. Still, others are used in cosmetics, lotions, contact lens cleaning solution, and nasal sprays as a preservative. Finally, some quats are used as first aid sprays to help prevent infection from minor wounds.

Where are quat-based disinfectants commonly used?

AT HOME
On non-porous surfaces such as floors, countertops, appliances, walls, toilet areas, and fixtures.

IN HEALTHCARE SETTINGS
On hard non-porous surfaces in hospitals and other healthcare facilities, including nursing homes and medical research laboratories.

FOR COMMERCIAL APPLICATIONS
Registered for use in food handling/food storage establishments on the premises and on equipment, in flower shops, and for industrial premises and equipment. Other commercial sites include funeral homes, athletic facilities, hotels, barber and beauty shops, convenience and grocery stores, offices, laundromats, correctional facilities, emergency vehicles, and transportation terminals.

IN SCHOOLS
On non-porous, high-touch surfaces in schools and daycare centers, libraries, gymnasiums, locker rooms, and other areas where children and others convene. Disinfection in schools after routine cleaning helps control outbreaks of communicable diseases.

What affects the performance of quat-based products?

Following directions is crucial. Many products are registered to sanitize and clean and/or disinfect. How the product is used and how long it is in contact with the surface affects the product's ability to completely disinfect the surface.

There are 36 different quat molecules used for disinfection. Quats have been around for decades and are registered by the EPA for both safety and efficacy.

To get the best results from a quat-based disinfectant, you must apply it properly. Carefully read and follow label directions for the product.

Are quat-based products safe to use?

- "Numerous regulatory bodies around the world have affirmed the safety of disinfectant Quats under current use conditions, including use as an active antimicrobial ingredient in consumer and commercial cleaning products." [1]
- "In the body, quats are poorly absorbed via the oral and dermal exposure routes (≤10%), are not systemically distributed, and are primarily excreted in feces. Quats are not dermal sensitizers, are not specific developmental or reproductive toxicants, are not carcinogenic or genotoxic, and do not cause systemic toxicity.[2]

References

Quats. Quats Education Program. Accessed June 24, 2021. https://www.quats.org/.

[1] DeLeo, Paul C, Carolyn Huynh, Mala Pattanayek, Katherine Clark Schmid, and Nathan Pechacek. “Assessment of Ecological Hazards and Environmental Fate of Disinfectant Quaternary Ammonium Compounds.” *Ecotoxicology and Environmental Safety* 206 (December 15, 2020). https://www.sciencedirect.com/science/article/pii/S0147651320309556.

[2] DeLeo, Paul, Anthony Luz, Mike Freemantle Schmid, and Nathan Pechacek. “Human Health Hazard Assessment of Quaternary Ammonium Compounds: Didecyl Dimethyl Ammonium Chloride and Alkyl (C12–C16) Dimethyl Benzyl Ammonium Chloride.” Regulatory Toxicology and Pharmacology 116 (October 2020). https://www.sciencedirect.com/science/article/pii/S0273230020301434.