



## A History Lesson In Green Disinfection

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### Sustainability

Author visits the past to lay the foundation for the future.

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Although environmentalism and conservatism can be traced back over a century, the modern green movement, as we know it today, truly took rise in the late 1960s and early 1970s.

Rachel Carson's bestselling book, *Silent Spring*, with its exposé on toxic chemicals in consumer products, set off a domino effect that saw, amongst other things, the founding of the [Environmental Protection Agency](#) (EPA) in 1970.

In the decades since, the green movement has picked up pace, reaching fever pitch in recent years, highlighted by the success of *An Inconvenient Truth*.

The result: Nearly no industry has been left untouched or unaffected, including that of chemical disinfectants.

An industry and its products — which by their very nature were thought impossible to be made environmentally preferable — are forging ahead with new technologies and asking policymakers to follow suit.

### History

The EPA was established to consolidate in one agency, a variety of federal research, monitoring, standard-setting and enforcement activities to ensure environmental protection.

Throughout its history, the EPA has established guidelines for the regulation of a variety of industries, including auto emissions, toxic substances and water quality.

The regulation of chemical disinfectants, sometimes referred to as antimicrobials, also came under their purview in 1972 when the responsibility for the [Federal Insecticide, Fungicide and Rodenticide Act](#) (FIFRA) was transferred from the [U.S. Department of Agriculture](#) to the EPA.

Under this legislative act, the EPA is responsible for validating the effectiveness, appropriate dosage and potential hazards of any product intended for use in the U.S. as a hard, non-porous surface disinfectant or sanitizer.

Their strict regulation of the content of antimicrobial product labels is intended to clearly display the product's validated attributes and ultimately to prevent unconfirmed statements of efficacy, safety, etc.

As part of this review and approval process, the EPA has already taken further steps to more easily identify products with more favorable personal health and safety profiles.

They use a distinct set of parameters to clearly categorize products based on their individual safety profile.

Each category represents a certain level of safety; for example, Category IV represents the safest

level and identifies those products that require no precautionary labelling.

Unfortunately, and despite the fact that environmental sustainability has also become a major decision-making criterion and more environmentally preferable disinfectant technologies have become available, the EPA has yet to adopt a similar policy for the categorization or identification of products based on their environmental preferability.

In fact, the EPA currently prohibits the use of any claims of environmental preferability, including the use of eco-labels, in relation to any hard, non-porous surface disinfectants or sanitizers.

But, why?

The dictionary defines disinfectant as a noun meaning: Any chemical that destroys vegetative forms of harmful microorganisms — such as bacteria and fungi — especially on inanimate objects.

This simple definition has caused many policymakers to believe that environmental sustainability or preferability of a disinfectant is simply a chemical impossibility.

If it kills pathogenic microorganisms such as bacteria, what's to say the chemical won't kill other non-threatening life forms?

In reality, this is true of most legacy disinfectant chemistries, including quaternary ammonium compounds (QACs).

### **Legacy Disinfectants: Quaternary Ammonium Compounds**

QACs are cationic, or positively charged, surfactants that act as disinfectants when used at the appropriate concentration.

They are also widely recognized as having an unfavorable overall environmental profile.

Although they are eventually biodegradable under aerobic conditions, they show no or very poor primary biodegradation and no evidence of any extent of ultimate biodegradation under anaerobic conditions.

Furthermore, the presence of QACs may also decrease the biodegradation of other surfactants.

It has also been found that cationic surfactants (QACs) are more toxic than anionic, or negatively charged, and non-ionic surfactants.

The median effective concentration ( $EC_{50}$ ) of most quats is below 1 part per million (PPM), meaning the biological activity of QACs is very high.

As a result, QACs are acutely toxic to aquatic invertebrates and fish.

Their  $EC_{50}/LC_{50}$  (concentration in water that is lethal to 50 percent of organisms) has been shown to be below 1 PPM.

It is these characteristics exhibited by QACs and other legacy disinfectants — chemistries that are used ubiquitously in a number of industries — that perpetuate the thought that disinfectants cannot, and will not, be environmentally preferable.

However, exciting new technologies and chemistries that exhibit true environmental sustainability and preferability are currently being developed and commercialized.

Unfortunately, there are simply no policies currently in place at the EPA to recognize their superior attributes.

### **So What, If Anything, Is Being Done To Change This?**

Not a moment too soon and no doubt as a result of significant consumer pressure, the EPA, in conjunction with the Agency's own [Design for the Environment Formulator Program](#) (DfE), recently conducted an "Internal Pilot" into a potential policy change that would allow claims of environmental preferability in regard to hard, non-porous surface disinfectants and sanitizers.

The intent of the "Internal Pilot" was to generate a greater understanding for both the DfE scientists and the Antimicrobial Registration Review staff as to what is involved in a review of environmental preferability and how that could ultimately be incorporated into the antimicrobial/disinfectant registration process.

Under this initial pilot program, both DfE and [Office of Pesticide Program](#) (OPP) staff evaluated products previously recognized under current DfE programs.

From this evaluation, the scientists will consider any modifications to criteria or to the actual process of reviewing environmental attributes.

At the completion of the "Internal Pilot," if the EPA perceives benefit in the continuation of such a program, the Agency anticipates the launch of an "External Pilot" that would presumably involve the participation of industry-leading companies and experts.

The EPA has also established a working group that will serve to develop options for further consideration, including an approach in which factual claims could be made about a product's so called green characteristics.

Bill Balek, director of legislative affairs for [ISSA](#), is part of this work group and notes, "EPA's announcement of the Internal Pilot is a positive step forward in developing an Agency policy that meshes with the demands of today's greener marketplace."

### **Potential Impact**

Although the implementation of this pilot and the development of the working group are simply the initial stages in the possible revision of the EPA's current policy, these first exploratory steps clearly represent those in the right direction.

Should the pilot bring forth recommendations for change and the allowance of validated green claims granted by the Agency, the potential impact on the industry could be considerable.

The current situation finds decision-makers in many industries searching for disinfectant products that offer a favorable and sustainable environmental profile.

Regrettably, the lack of regulatory oversight, combined with the development of elaborate marketing campaigns making claims of environmental preferability without substantiation, is causing a confusing landscape for consumers and end users.

Many industry insiders refer to this as "greenwashing" and it can present itself in many different forms.

With the implementation of a formal registration and validation process, the industry decision-makers will no longer be forced to wade through the mire of smoke and mirrors marketing to uncover the true environmental profile of a disinfectant.

The result will undoubtedly be the emergence of products that are successful in finding the

balance between efficacy, safety and environmental sustainability without compromise.

With pathogenic outbreaks no longer only a health care concern, infection control has gone mainstream, infiltrating our schools and workplaces.

Disinfectant use is on a dramatic rise and everyone will benefit from the use of greener product choices once credible certification exists.

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