United States Environmental Protection Agency

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Peracetic Acid as a Green Disinfectant

THE ENVIRONMENTAL CHALLENGE

Efficient removal of pathogenic bacteria, viruses and protozoan parasites from wastewater is critical to decrease the risk of waterborne infections. Sewage discharges may increase the contamination risk of surface waters and this risk is further increased if raw surface waters are used for drinking water, recreation, seafood harvesting or agriculture.

Disinfection of drinking water is one of the major public health advances of the 20th century because it prevents the spread of waterborne illnesses. An ideal disinfection system should efficiently and reliably eliminate infectious agents under a range of wastewater flow rates and qualities. The disinfection process should not produce toxic, mutagenic or carcinogenic disinfection by-products (DBPs) or persistent disinfectant residues that have adverse environmental effects.

Wastewater disinfection occurs via oxidizing chemicals (e.g., chlorine, ozone, peracetic acid and related compounds). Chlorine has been the primary disinfectant used for most disinfection systems because it reduces pathogenic microorganisms reliably at a reasonable cost. However, there are several issues regarding the use of chlorine, including its effect on health and safety, that have prompted the development of alternative disinfectants.

ADDRESSING THE CHALLENGE

To respond to EPA's Strategic Goal #2 (Clean and Safe Water), the primary aim of this project is to evaluate the disinfection efficiency of peracetic acid (PAA) as a green alternative to chlorine. PAA is expected to reduce or eliminate toxic DBP formation, sodium pollution and the number of total dissolved salts in treated water. EPA is conducting laboratory-scale, bench-scale and field tests to study the effectiveness, as well as the environmental and economic aspects, of PAA as a disinfectant.

EPA Cincinnati Water Technology Cluster Team

The EPA Cincinnati water technology cluster team promotes the research, development and deployment of cost-effective, innovative water technologies that demonstrate tenets of sustainability, timeliness, innovation and responsiveness.

The cluster team holds the following objectives as it strives to resolve water challenges:

- **Promote innovation in the water technology sector in the Cincinnati, Dayton, northern Kentucky and southeast Indiana region by communicating water challenges, Agency priorities and technology needs.**
- **Foster and generate water technology R&D collaborations among internal and external partners within the region by facilitating access to EPA research facilities and equipment.**
- **Help identify, protect and transfer EPA intellectual property to the marketplace.**

OH/KY/IN/PA REGIONAL COLLABORATORS

- Solvay Chemical, Inc. (Solvay)
- Shaw Environmental, Inc. (Shaw)
- Metropolitan Sewer District of Greater Cincinnati (MSDGC)

PROJECT OBJECTIVES

The following studies have been and will be conducted on the effectiveness of PAA as a green disinfectant:

- Laboratory-scale tests on *Escherichia coli (E. coli)* and other pathogens
- Bench-scale tests on *E. coli*
- Third-party field tests on *E. coli* and other pathogens at MSDGC

OUTCOMES

Solvay has worked to produce and research PAA as an economically viable alternative to chlorination. Solvay has signed a Cooperative Research and Development Agreement (CRADA) with EPA for conducting laboratory, pilot and field tests to study PAA water treatment, including economic aspects for commercialization. The project CRADA also allows for field testing by Shaw at EPA's Test and Evaluation center. The field testing will be conducted with MSDGC. The outcome of this project will be practical information regarding PAA's usefulness as a green alternative to chlorine-based water disinfectants to reduce DBPs.

www.epa.gov/nrmrl/watercluster

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