BP Acetyls Americas

# Peracetic acid

A cost effective disinfectant for wastewater treatment with minimal aquatic impact and fewer greenhouse gas emissions

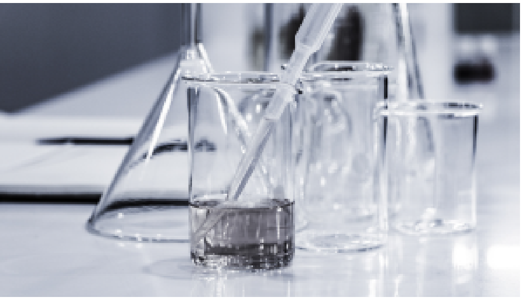
**The Clean Water Act (CWA)** set the guidelines over 40 years ago for waste water control in the United States. Since that time, population growth and changes in industrial processing technologies have increased demands and created new challenges for the thousands of municipal wastewater treatment facilities currently operating throughout the U.S.[1] In addition to budget constraints key challenges for municipalities often include:

- The character and quantity of contaminants presenting challenges today
- Decentralized systems
- Greater concern for aquatic toxicity, greenhouse gas emissions (GHG) and carbon footprint

**Peracetic Acid (PAA)** has been shown to effectively reduce E. coli, fecal coliforms, and other harmful bacteria and viruses in wastewater treatment applications[2]. It can also have a lower operating cost and fewer GHG emissions than chlorination. Other benefits of PAA include:

- **Reduces total dissolved solids (TDS)**
- **Does not form halogenated by-products**
- **Effective over a wide pH range**
- **Simple operating process**
- **Relatively low capital investment cost**

# Drawbacks of chlorine



Chlorine use in wastewater treatment dates back over 50 years, and continues to be a widely used disinfectant - its capital and operating costs are lower than UV and ozone methods, and it is effective in destroying many types of pathogenic organisms.[3]

A major drawback associated with chlorine, however, is the creation of hazardous disinfection by-products including trihalomethanes (THMs) and its toxic effect on aquatic life[4]. The EPA's Safe Drinking Water Act, including the Stage 1 Disinfectants and Disinfection By-products Rule and the Interim Enhanced Surface Water Treatment Rule[5], is creating an increasing burden on municipalities to update technology and treatment techniques and allocate funds to detect and remove more contaminants.

Public wastewater treatment facilities in the United States generate approximately 8 million tons of sludge annually, according to a study conducted by the Center for Sustainable Systems at the University of Michigan, and approximately one-third of their total electricity use is for the treatment of sludge[6]. The production of chemicals used to treat the by-products and the life cycle impact associated with the transportation of those chemicals to the site also causes GHG emissions.

Higher dechlorination costs, more stringent EPA requirements, and increasing concern over the total impact chlorine may have on the environment is encouraging wastewater treatment professionals to investigate alternate disinfectant options.

# What is peracetic acid?

Peroxyacetic acid, also known as peracetic acid or PAA, is a colorless and highly acidic organic compound that has a formula of CH3CO3H. Acetic acid and hydrogen peroxide are used as principal constituents in the manufacturing process of peroxyacetic acid. PAA is commercially sold in its refined structure, distilled, or as a 1-50% solution that is dependent upon the application containing hydrogen peroxide, acetic acid and water.

# Benefits of PAA

PAA is a potent oxidizer and does not form any halogenated by-products. Full-scale trials at various facilities including the East Bay Dischargers Authority in San Francisco have confirmed that PAA is not persistent in the environment with holding times as low as 15 minutes[7]. Its rapid decomposition negates the need to deactivate PAA, which reduces the chemical costs associated with systems employing chlorination and dechlorination reducing GHG emissions.

PAA does not react with ammonia or many other nitrogen-based chemistries[8], or contribute to TDS in the water, which further reduces the need for additional treatment.

PAA can often be incorporated into an existing system with minimal changes to assets if a liquid chlorine disinfection system is already in place, keeping implementation costs low. And unlike chlorine, PAA does not require on-site generation, reducing employee safety concerns. Basic design requirements include:

- Peracetic acid bulk tank or secure location to maintain chemical totes
- Chemical pump and tubing
- Dedicated injection line

# Availability

EPA-approved peracetic acid concentrations range from 12%- 22% and are available in a variety of packaging (gallons, totes, drums, and bulk). Its shelf life of up to one year[9] reduces handling and procurement requirements.

# EPA Compliance

Several manufacturers offer PAA products that are EPA-approved for use in wastewater disinfection. Studies must be performed to determine the flow requirements specific to each municipality.

# Quick facts about PAA

Peracetic acid is FDA, EPA, and USDA approved in the US as a disinfectant in the food and healthcare industries[10], and has been regularly used as a wastewater and stormwater disinfectant in Europe and Canada for the past 30 years.

Studies evaluating PAA as a wastewater treatment alternative have been published with favorable results. PAA is in use in over 50 municipalities throughout the US according to a 2018 Water Research Foundation study.[10]

## About BP

BP is one of the largest North American suppliers of acetic acid, a key ingredient in peracetic acid. We have two production sites and strategically located terminals through N.A. to service our PAA manufacturing customers' needs.

## Learn more

To learn more about peracetic acid or to schedule a technical evaluation of your facility with implementation costs and estimated savings, please contact your local PAA manufacturer or distributor.

## Footnotes:


[1] EPA Office of Wastewater Management, Primer for Municipal Wastewater Treatment System, EPA 832-4-04-001, September 2004

[2] Water 2017, 9, 427; doi:10.3390/w9060427. Peracetic Acid (PAA) Disinfection: Inactivation of Microbial Indicators and Pathogenic Bacteria in a Municipal Wastewater Plant

[3] Ibid.

[4] EPA Wastewater Technology Fact Sheet. Dechlorination. EPA 832-F-00-022, September 2000

[5] EPA Office of Water, Understanding the Safe Drinking Water Act, EPA 816-F-04-030 June 2004

[6] Center for Sustainable Systems, University of Michigan. 2018. "U.S. Wastewater Treatment Factsheet." Pub. No. CSS04-14

[7] Water News.org, Peracetic Acid Full Scale Trial At East Bay Discharges Authority for Disinfection of Secondary Effluent, June 19, 2018

[8] Schnitzer, M. and Hindle, D.A., 1980. Chemistry and Biology Research Institute, Agriculture Canada K1A0C6. Effect of peracetic acid oxidation on N-containing components of humic materials.

[9] Bell, K. and Stewart, S. (2014). Engineering Design Considerations for PAA Disinfection of Wastewater, WATERCON, Springfield, IL

[10] United States Department of Agriculture, Peracetic Acid Technical Handling Report compiled by OMR for the USDA National Organic Program, March 3, 2016

[11] The Water Research Foundation. Peracetic Acid for Municipal Water and Wastewater Related Process Online Workshop, March 20,2018.