BRENNTAG

ConnectingChemistry

APPLICATION BULLETIN

PROCESS WATER AND SYSTEM SANITATION

Clorious2

High purity, ready-to-use chlorine dioxide

Removal of biofilm and persistent microbial control throughout your entire process water system

BACKGROUND AND CHALLENGE

In a wide array of industries, an optimal water quality is imperative for securing smooth production processes and assuring product quality alike. Treatments plants for the production, transport and re-use of industrial process water typically contain components such as ion exchangers, gravel and sand filters which are integrated in a larger system of interconnected piping, basins and storage tanks. The sophistication of such systems depends on the water quality requirements.

Besides monitoring the chemical parameters, microbial control of the water forms part of the quality assurance of the treatment process. When the microbiological parameters are compromised, biofilm is usually not far away.

Providing a safe haven and breeding ground for a broad spectrum of microorganisms, biofilm is the prime responsible for pathogenic proliferation throughout the entire system. Failure to remove biofilm and prevent its recurrence may result in microbiologically induced corrosion (MIC), suboptimal production processes and contamination of the final product. Also, sulfate reducing bacteria in the biofilm may form toxic hydrogen sulfide gas, which poses a risk to workplace safety.

Biofouling occurs in nearly every water-based industrial process, where biofilm attaches to inner surfaces and in dead ends and bends of mains, to walls of tanks, and filler materials, for example in resin beds of ion exchangers.

Pipelines, tanks and other water-bearing parts such as valves, joints and seals are prone to biofilm deposits. Biofilm can also settle and thrive in the gravel and sand filters causing an increase in the resistance to flow and constituting a source of recontamination of the water system when detaching. Consequently, biofilm can directly or indirectly lead to quality problems and to additional costs associated with remedial action, maintenance and downtime. Finally, biofilm formation can adversely affect the performance of the ion exchangers during operation, extend the regeneration cycles and increase the conductivity.

Treatment measures aimed at biofilm prevention and control may not always have the desired effect due to the complexity of the process water treatment. However, such measures are essential to achieve a lasting improvement in process water quality.

As biofilm typically proliferates throughout the entire water circuit, all measures should encompass the whole system as well.

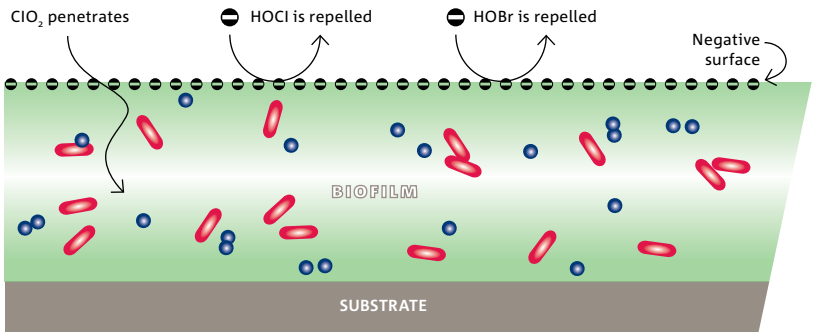
Process water and system sanitation

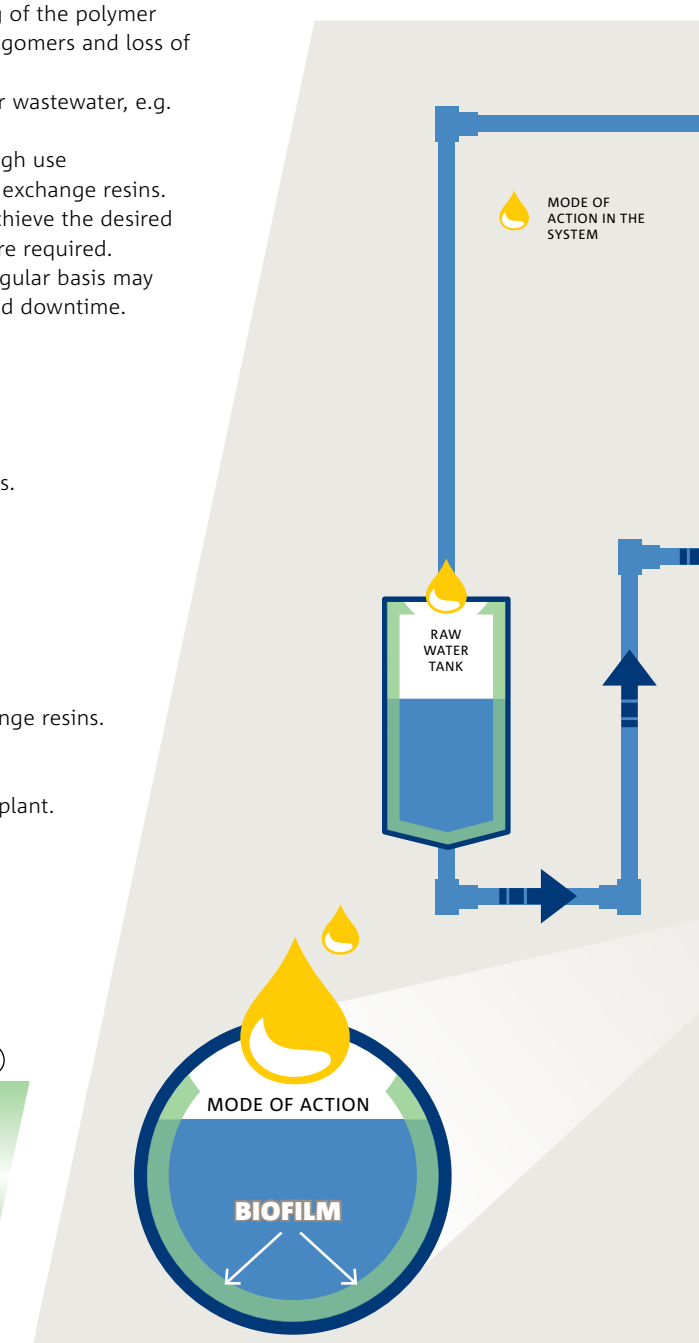
CONVENTIONAL SANITATION PROGRAMS

- Separate cleaning of individual system components, such as basins, mains, tanks, resins and filters, for operational reasons may result in microbiological contamination throughout the entire system, using the water as its major pathway for proliferation.
- Neglecting or skipping parts of the system increase the risk for cross contamination e.g. by carryover of biofilm from an untreated basin into a clean one.
- Consequently, no consistent and integrated treatment concepts for microbial control.
- On site hypochlorite generation (electrolysis of a brine solution) is often used in softening plants. This creates free chlorine, which has a harmful effect on ion exchangers as it causes slow and irrevocable damage to resins. This is accompanied by a dewetting of the polymer structure, which in turn leads to an increased resin volume, detachment oligomers and loss of capacity, especially in case of anion exchange resins.
- The use of halogen-based compounds may compromise discharge limits for wastewater, e.g. AOX.
- Treatment alternatives like peracetic acid and hydrogen peroxide require high use concentrations to be effective which, conversely, are incompatible with ion exchange resins.
- “Mild” non-oxidising agents are less effective in stripping the biofilm. To achieve the desired result, if possible at all, several time and cost-consuming treatment steps are required.
- Failure to clean the filler materials in the ion exchangers and filters on a regular basis may result in premature replacement of these media which comes with costs and downtime.

BENEFITS OF CLORIOUS2

- Innovative, one-step sanitation concept for process water treatment systems.
- Removal of biofilm without mechanical cleaning.
- Works extremely quickly; cleans and disinfects.
- High purity and efficacy enable a robust yet gentle sanitation of all system parts and components that come in contact with water, such as tanks, pipelines, filters and also the sensitive ion exchange resins.
- Highly soluble in water with residual activity; reaches all places and ends of the system, even the most remote ones.
- Contains no free chlorine that could cause oxidative damage the ion exchange resins.
- Negligible chloride levels; not corrosive at proposed use concentrations.
- High dosing accuracy, no overdosing.
- Simple, plug-and-play application; can be used at multiple locations in the plant.
- Safety first: a closed dispensing system ensures dry (de)coupling with no exposure to the chemical for operators.

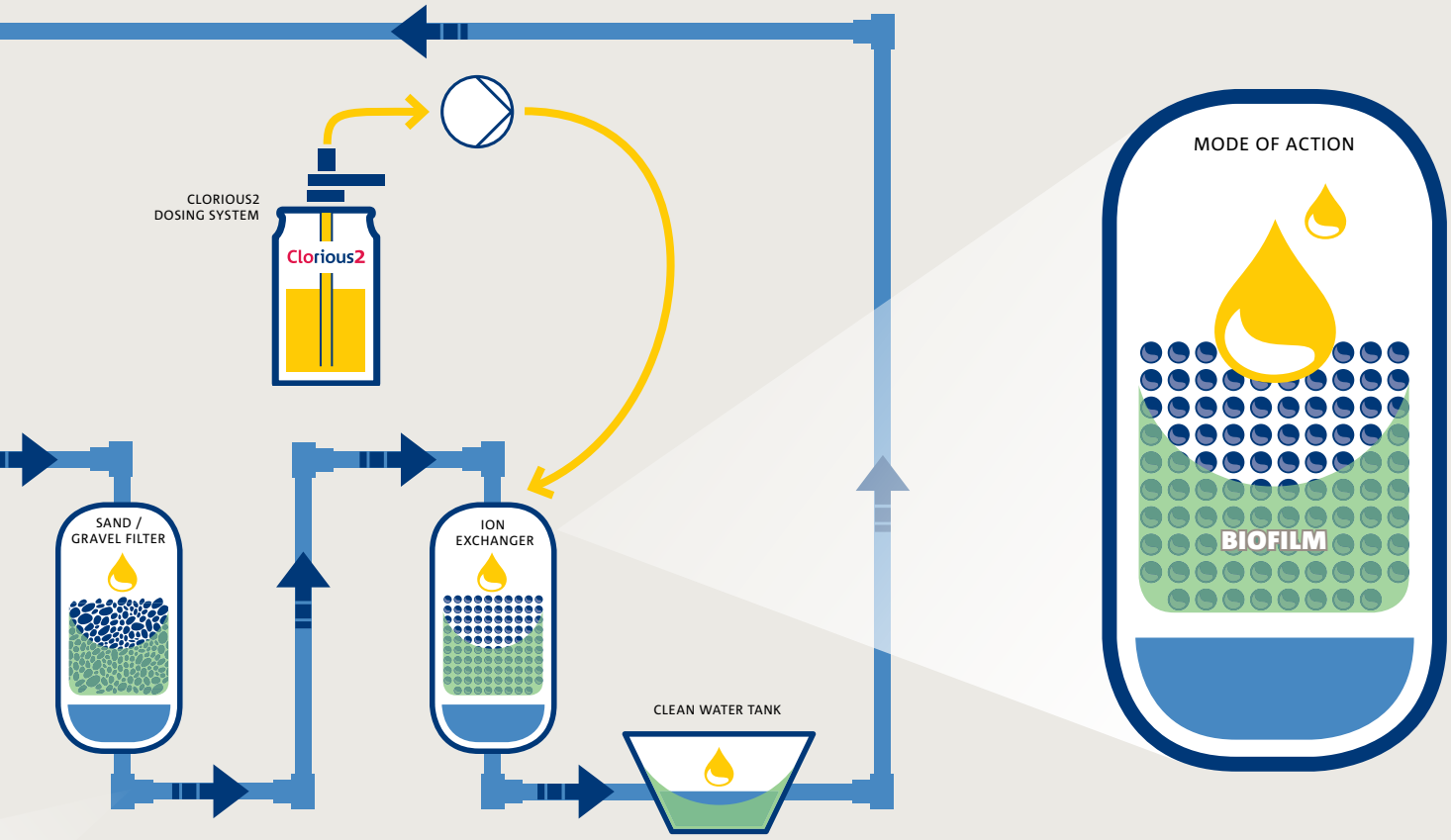




PRACTICAL IMPLEMENTATION

- Prior to commencing the treatment with Clorious2 and where possible, the tanks, basins and mains shall be cleaned mechanically and refilled with clean water up to the normal level.
- Clorious2 is added undiluted to the appropriate parts and components of the process water circuit with standard dosing equipment suitable for chlorine dioxide. The injection point shall be underneath the water surface to prevent the chlorine dioxide from gassing off.
- The water is then recirculated to assure a homogeneous distribution and sufficient residence time of Clorious2 throughout the system. In this way, a comprehensive sanitation of the entire process water circuit can be accomplished in one single step.
- Typical feed rates vary between 0.5 and 10 ppm chlorine dioxide, depending on the characteristics of the system and the degree of contamination present therein.
- It is recommended to slug dose Clorious2 at multiple intervals. Doing so prevents overdosing and gives a better understanding of the required dosing quantity. The frequency depends on how rapidly the chlorine dioxide concentration decreases after addition. The faster it decays, the more contaminated the system is.
- Residual chlorine dioxide concentrations in the system can be monitored with specific, substantiated methods like the DPD- Glycine method, Palintest or online using chlorine dioxide electrodes.
- The treatment of ion exchange systems may take place during the usual regeneration cycles, and does not cause any additional stoppages.
- After treatment, the water shall be discharged to prevent recontamination or a transfer of microbiological contamination.

MODE OF ACTION IN THE SYSTEM



RESULTS

- Thorough sanitisation of the entire process water system in one step with one single product.
- Simple, effective and permanent removal of biofilm in filters, ion exchangers, lines and storage tanks.
- Prevention of recontamination.
- Enhanced process hygiene means better water quality and lasting improvements in production processes.
- Longer intervals between mechanical cleaning.
- Increased process stability means less downtime and lost production, which saves money.

Clorious2 Clean

Intended uses (BPR, PT 2)

- Disinfection of surfaces, materials, equipment and furniture which are not used for direct contact with food or feeding stuffs. Usage areas include, inter alia, swimming pools, aquariums, bathing and other waters; air conditioning systems, and walls and floors in private, public, and industrial areas and in other areas for professional activities.
- Disinfection of air, water not used for human or animal consumption, chemical toilets, waste water, hospital waste and soil.
- Products used as algaecides for treatment of swimming pools, aquariums and other waters and for remedial treatment of construction materials.
- Products manufactured to be incorporated in textiles, tissues, masks, paints and other articles or materials with the purpose of producing treated articles with disinfecting properties.

Clorious2 Guard

Intended uses (BPR, PT 11)

- Preservation of water or other liquids used in cooling and processing systems by the control of harmful organisms such as microbes, algae and mussels.

Intended uses (BPR, PT 12)

- Prevention or control of slime growth on materials, equipment and structures, used in industrial processes.

Source: http://echa.europa.eu/

PACKAGING

Available in dedicated drums (208 kg net) and cans (25 kg net).

CLORIOUS2: USING CHLORINE DIOXIDE HAS NEVER BEEN SO SAFE AND SIMPLE

Process water and system sanitation

/ in one step
/ with one single product
/ throughout the entire system

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Clorious2