



a clear solution

EcoClearProx®

An innovative H₂O₂ disinfection product

Bieau aims at bringing a valuable alternative for classical disinfection, decontamination or pathogen controlling methods in drinking water production, health care, agriculture and horticulture.

The key words of our mission are sustainability, efficacy, and respect for humans, animals and environment.

A reason more to consider a better future with products of Bieau, products which are entirely compatible with the care of today for sustainable development.

Moreover, Bieau remains to develop its products further so that in the near future we can offer you a broader spectrum of products that brings protection with regard to human, animal or plant health and contributes to a better environment.

- EcoClearProx® is a patented biodegradable hydrogen peroxide (H₂O₂) solution,
- EcoClearProx® is registered for a broad spectrum of applications.
- Bieau permanently invest in the development of new applications of EcoClearProx®, its dilutions or derivatives.
- Bieau as organisation: Business Development & Sales, Research & Development, Administration

H₂O₂ is one of the most powerful known oxidants – stronger than chlorine, chlorine dioxide and potassium permanganate. Catalysation allows to transform H₂O₂ into hydroxyl radicals (OH·) whose oxidizing power is 2nd to fluorine H₂O₂ decomposes in water and oxygen without forming any by-products

Mode of action of hydrogen peroxide

Release of atomic oxygen that disturbs microorganisms

Production of superoxide and hydroxyl radicals which damage key components of the cell including fats, proteins and DNA ultimately resulting in cell death

The impact on proteins is particularly important, e.g. damage to the proteins in spore walls and the breakdown of peptide compounds



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Sulfhydryl groups of proteins and double bonds in fatty acids appear to be very sensitive

Bonds with and oxidizes organic and necrotic material

Reference: McDonnell, G.E. 2007. Antisepsis, Disinfection, and Sterilization: Types, Action, and Resistance. Blackwell Publishing, 361 p.

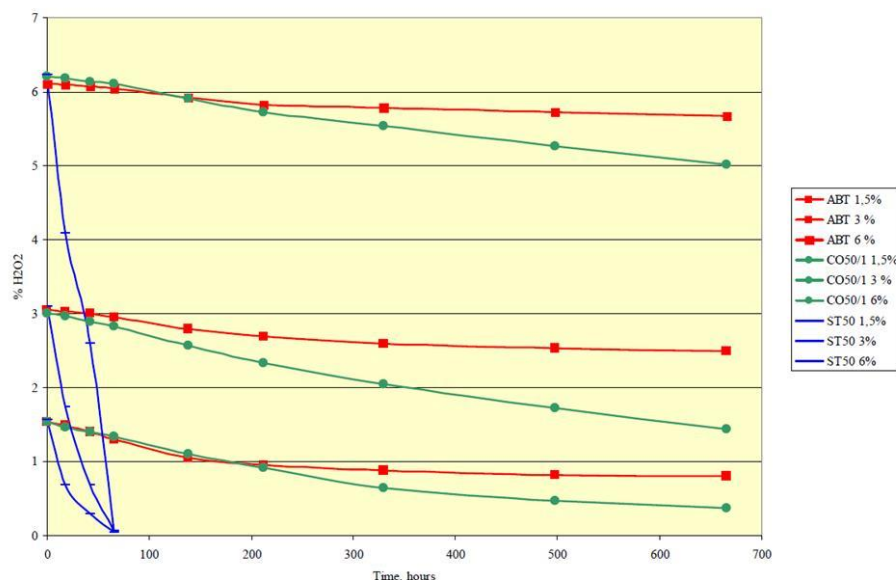
Why to use EcoClearProx

EcoClearProx® = H₂O₂ with a plus

An extensive range of additives for stabilising hydrogen peroxide has been investigated. They include, e.g. silver nitrate, inorganic salts like phosphates, pyrophosphates or stannates, organic compounds, such as organic chelates or organic acids (e.g. acetic acid), various phosphonic acids, including ethylene diamine tetra methylene phosphonic acid (EDTMP) and diethylene triamine penta methylene phosphonic acid (DTPMP), acetonitrile, oxyquinoline sulfate, etc.

Stability: EcoClearProx® has a pronounced shelf life which is very important for transport in extensive pipework systems

Comparison ABT and Solvay



EcoClearProx® is a stabilised hydrogen peroxide solution without addition of silver, because:

- Silver is toxic to all living cells
- Silver contributes to antibiotic resistance
- Silver is deposited around nerves and in deeper skin layers and may cause permanent skin damage
- Silver is intimately associated with environmental contamination of other toxic heavy metals such as mercury and lead
- Silver sticks to fish gills, potentially choking them to death
- Silver disturbs bacterial activity when cleaning sewage
- Silver prevents the use of sludge as fertilizer, needed for nutrient recycling
- http://ec.europa.eu/research/environment/pdf/hylanderhaxton_not_2906_en.pdf
http://www.dnsy.se/_upload/lfm/2006/silver_fact_sheet.pdf

Effectivity

EcoClearProx® has been tested effective against gram-positive as well as gram-negative bacteria, viruses, fungi and yeast, algae and it prevents building up of slime and foam.

In agreement with this EcoClearProx® has been tested successfully against:

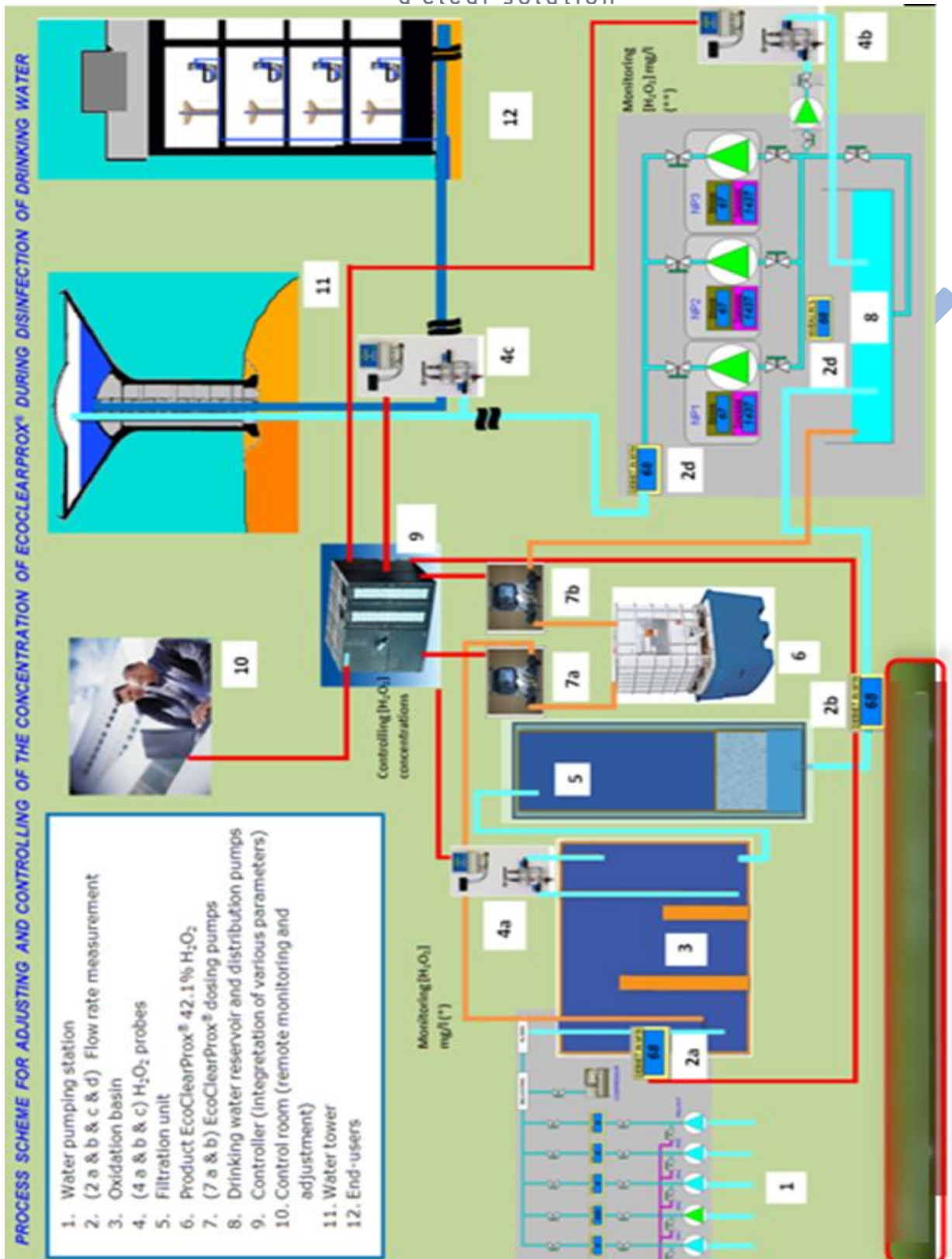
bacteria: *Pseudomonas aeruginosa*, *Escheria coli*, *Staphylococcus aureus*,
Enterococcus hirae, *Legionella pneumophilla*

Fungi: *Aspergillus niger*

Yeasts: *Candida albicans*

Viruses: H5N1, H1N1





EcoClearProx® has a high efficiency for eradication of bacteria, viruses, yeasts, fungi and spores thereof as proven for various applications

EcoClearProx® removes Biofilm

Biofilm removal has been claimed by several authors and for several H₂O₂ blends, this is of course concentration and time dependent. A first proof for EcoClearProx® was obtained on the first drinking water pilot site (IWM at Leopoldsburg). At this drinking water station, the H₂O₂-concentrations in a 200-metre pipeline was monitored during a test period of 3 months. This pipeline has been exposed to chlorine (< 0.25 mg free chlorine/l) before, although the last year no chlorine has been used at all. From the starting point EcoClearProx® was injected in this pipeline there was a immediate drop from 0.1 mg H₂O₂/l to 0.03 mg H₂O₂/l. However, after 4 days of EcoClearProx® dosage the pipeline was cleaned as no further decline in H₂O₂ concentration was observed after these 4 days. The H₂O₂ concentration at the inlet and the outlet of the pipe were the same (0.1 mg H₂O₂/l). These results are supported with the results of other groups, e.g. by Christensen et al. (1990) who showed that biofilm removal can be accomplished with hydrogen peroxide at levels well below those required for total disinfection and point to a mechanism where the extracellular biopolymer matrix is degraded rather than intracellular components.

Expensive?

Look at this table, coming from a live test.

EcoClearProx	Chlorine 33%
83,6l	1000l
8,36%	100%
Odorles	smelly
No biofilm	biofilm
No negative by products	trihalomethanes, haloacetic acids, mono-, di- and trichloramines, etc.
No influence by pH	Strong pH influence



EcoClearProx[®] generates clean, clear and odorless water that does not contain harmful disinfection byproducts. Disinfection byproducts are formed when disinfectants, such as chlorine, react with natural organic matter (NOM), such as humic and fulvic acids, which are naturally present in the water. These materials end up in water during the decomposition of plant matter. This is not the case for EcoClearProx[®].

A zero concentration of disinfection byproducts with EcoClearProx[®] is therefore another major reason for choosing EcoClearProx[®] above chlorine, of which the latter is under pressure due to the generation of trihalomethanes, haloacetic acids, mono-, di- and trichloramines, etc.

Chlorine smells are caused by trihchloramines and are the result of the reaction of chlorine with nitrogen compounds. Sulfur and its many compounds are present in gaseous, liquid and solid states. The sulfur form that is responsible for the rotten egg odor in water is hydrogen sulfide, most commonly produced by sulfate-reducing bacteria residing in aquifers or distribution systems. Hydrogen sulfide is a comfort problem but not a health hazard in the concentrations found in drinking water. 1 mg/L of H₂O₂ is needed to oxidize 1 mg/L of hydrogensulfide.

EcoClearProx[®] can be used successfully for the oxidation of organic matter, the removal of undesired organic compounds as for controlling microbial levels and biofilms.

The efficacy of EcoClearProx[®] can be increased when combined with UV. Further research is ongoing.

