

EMERALD®

THE WORLD'S LEADING ELECTROCHEMICAL SYSTEMS

MIXED OXIDANTS WATER DISINFECTION AND PURIFICATION
ON-SITE DISINFECTANTS AND DETERGENTS SYNTHESIS
SAFE CHLORINE GAS AND CAUSTIC SODA PRODUCTION

ANY LOCATION! ANY QUANTITY!



WHO SAYS
ELECTRICITY AND
WATER DON'T MIX?



EMERALD ECOTECHNOLOGIES company

produces compact modular electrochemical devices that are unparalleled in the world and allow in any location and quantity without the use of harmful chemicals the:

- Disinfection and purification of drinking water, seawater, wastewater and swimming pool water.
- Synthesis of environmentally friendly disinfectants and detergents.
- Safe on-site production of chlorine gas, hydrogen, as well as a whole range of acids and alkalis, including sodium hydroxide, hydrochloric acid, hypochlorous acid, hydrogen peroxide.

EMERALD DEVICES PRODUCT LINE



EMERALD HOME — household and office water purifiers and ionizers produce healthy antioxidant drinking water enriched with hydrogen.

Patents RU № 2322394, 2322395, 2350692; UK № 2 253 860, 2 257 982.

Pp. 6–7



EMERALD TURBO — complete on-site purification and disinfection of drinking, wastewater, seawater and swimming pool water.

Patents RU № 2322394, 2322395; UK № 2 253 860, 2 257 982.

Pp. 8–9



EMERALD AQUACHLOR — large-scale on-site mixed oxidants disinfection of drinking, wastewater, seawater and swimming pool water.

Patents RU № 2088693, 2270885, 2176989, 2516150; USA № 7,897,023.

Pp. 10–11



EMERALD STEL — on-site production of ecological mixed oxidants sanitizer against all viruses and bacteria and detergent solution.

Patents RU № 2155719, 2207983, 2208589, 2322397, 2321681; USA № 7,897,023.

Pp. 12–13



EMERALD ECOCHLOR — safe on-site production of wet or dry chlorine gas and sodium hydroxide solution.

Patents RU № 2088693, 2270885, 2176989, 2350692; USA № 7,897,023.

Pp. 14–15

EMERALD devices are certified, patented and successfully used in many areas

of human activity: water treatment, medicine, pharmacy, veterinary medicine, agriculture, food, oil and gas, chemical industry, utilities, transportation, mining of precious, rare earth and radioactive metals.

Practical experience shows that the use of EMERALD devices results in more than 10x savings of chemical reagents, multiplies the efficiency of various technological processes, reduces CAPEX and OPEX, also due to the reduction of electric power, labor and time consumption, which is especially important nowadays for the world economy transition to a new technological level, ensuring sustainable development.

LICENSEES AND CUSTOMERS



FROM 1991 TO 2023, OUR GROUP OF COMPANIES HAS MANUFACTURED AND DELIVERED WORLDWIDE MORE THAN:

- 300,000 units of EMERALD HOME and EMERALD TURBO devices for disinfection, purification and conditioning of drinking water in apartments and residences.
- 60,000 units of EMERALD STEL devices for on-site production of environmentally friendly Anolyte mixed oxidants sanitizer for disinfection and sterilization of various objects in medical institutions.
- 1,500 units of EMERALD AQUACHLOR devices for on-site mixed oxidants disinfection of municipal drinking water and wastewater, swimming pool water, as well as EMERALD ECOCHLOR devices for on-site synthesis of chlorine gas and sodium hydroxide solution.

An important feature of all EMERALD devices is the absence of replaceable or fast-wearing parts.

The average service life of EMERALD devices is 12 years.

The average payback period (ROI) is no more than 2 years.

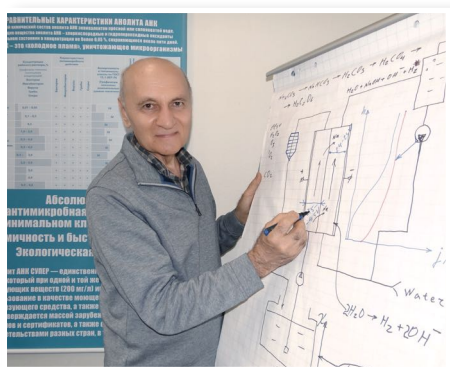
In total: 10 years of profit + preserving the Planet's ecology!

EMERALD devices are based on electrochemical activation technology (ECA). The essence of ECA technology consists in electrochemical synthesis and subsequent use of electrochemically activated (metastable) substances instead of traditional stable reagents.

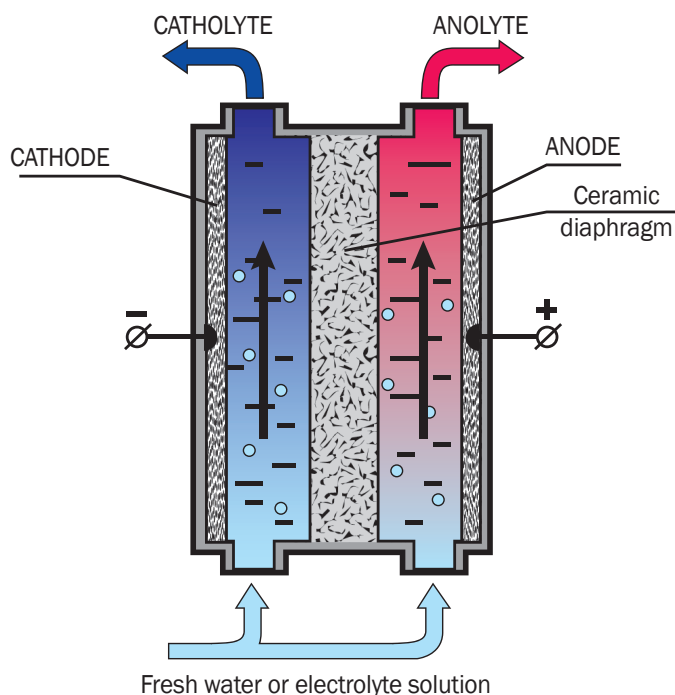


The main working element of EMERALD devices is the electrochemical Bakhir Module (MB element) with a porous ceramic diaphragm. MB electrochemical modules are protected by patents № RU 2350692; USA 8,961,750; UK 2479286.

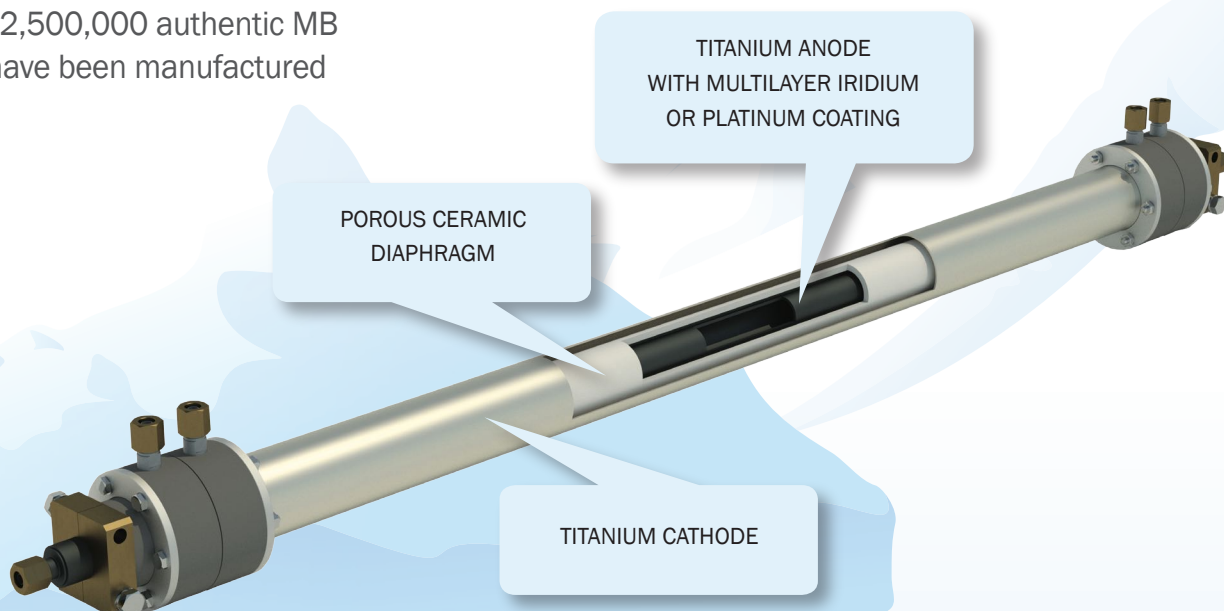
EMERALD devices are developed and manufactured in R&D partnership with the Vitold Bakhir Electrochemical Systems and Technologies Institute — the world's leading scientific center in the field of electrochemical activation. More than 50 years of experience and modern discoveries have made it possible to manufacture EMERALD devices unrivaled throughout the world in terms of their technical features.



Vitold Bakhir
Prof., Dr. of Science,
Author of ECA technology



- More than 50 years of experience
- More than 400 patents registered in 50 countries
- More than 2,500,000 authentic MB elements have been manufactured



Reliability, efficient power consumption and modularity of MB elements enable the manufacture of a variety of devices to suit each specific case.

EMERALD HOME device for household water purification and ionization:

- 60 liters per hour
- 2 MB-11 elements



EMERALD AQUACHLOR device for large-scale water disinfection:

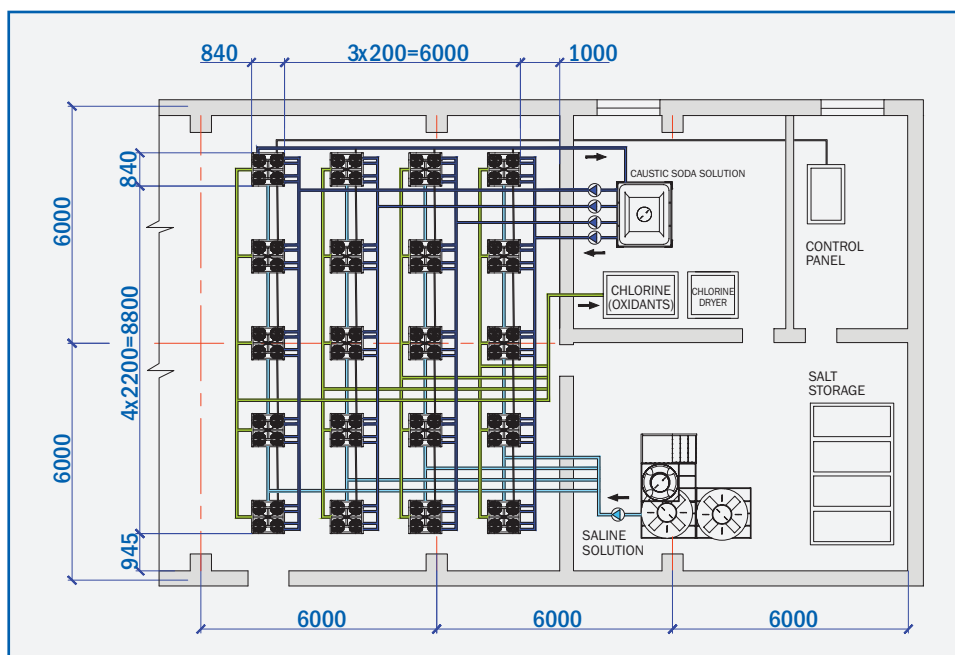
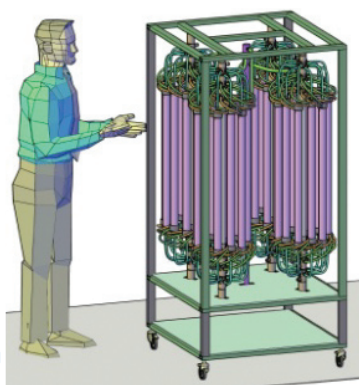
- 2,000 m³ per hour (2.0 kg/h FAC capacity*)
- 16 MB-26 elements

*Capacity in terms of free available chlorine



Compact and safe chlorine-caustic plant based on 20 units of EMERALD ECOCHLOR devices:

- 120.0 kg/h FAC capacity
- 960 MB-26 elements



ELECTROCHEMICAL MB ELEMENTS ADVANTAGES:

- The ceramic diaphragms do not require periodic replacement and can be easily washed with any common acids (citric, acetic, hydrochloric or phosphoric) in case of impurities.
- MB elements service life is more than 50,000 hours of continuous work.
- Wide possible concentration of source electrolytes: from 0.001 to 10 mol per liter.
- Automatic anode cooling and self-cleaning of the diaphragm and cathode chamber.



High significance of ECA technologies is noted in the resolution of the BRICS Water Forum Expert Council in 2016:

"To strengthen cooperation of the BRICS countries in the areas of activities related to industrial production of the most important products of the chemical industry (chlorine, caustic soda, persulfuric acid, hydrogen peroxide) at the places of consumption, as well as for reagent-free regulation of physical and chemical properties of water and aqueous solutions, through the use of electrochemical activation in technological processes..."

EMERALD HOME — living water for your health!

EMERALD HOME devices enrich water with hydrogen and purify it from microbes, heavy metals, iron, manganese and hydrogen sulphide, as well as remove harmful organic compounds from water (including herbicides, pesticides, surfactants, antibiotics, hormones). The devices operate on cold tap water. The rated capacity is from 60 to 250 liters per hour of clean and healthy antioxidant water.

Pure antioxidant water helps to normalize the metabolism and functioning of internal organs, cleans wastes and toxins in the body, strengthens the immune system and increases physical vitality.



EMERALD HOME 60 OFFICE

- The device in a form of a point-of-use water dispenser with water heating and cooling function.
- For offices, fitness and spa centers, hotels, kindergartens, schools, universities.
- Capacity 60 l/h.



EMERALD HOME 60 LUX

- The device for kitchen installed under or above the sink with an additional option of sanitizing water production.
- For apartments and country houses.
- Capacity 60 l/h.



EMERALD HOME 250 SPA

- The device for making antioxidant bath and shower water therapies.
- For apartments, resorts, medical, fitness and spa centers.
- Capacity 250 l/h.

ADVANTAGES:

- Nature-like water treatment principle: the combination of carbon and quartz filters with electrochemical water treatment.
- Guaranteed water disinfection quality during the entire service life.
- The water is enriched with hydrogen acquiring useful antioxidant properties.
- Water purification costs in EMERALD HOME devices (\$0.003 per 1 liter) are approximately 5 times cheaper than in domestic RO systems and 200 times cheaper than the cost of bottled water in supermarkets.
- No fast-wearing elements. The whole system is simply periodically washed from accumulated impurities by citric acid solution.
- With higher quality, the price of EMERALD HOME devices is several times lower than the price of Japanese or American water ionizers.

EMERALD HOME DEVICES PRODUCT LINE

Model	Performance in pure antioxidant water (catholyte), l/h	Power consumption, no more than, W	Dimensions, WxHxD, mm	Net weight, kg
EMERALD HOME 60	60	60	140x353x121	3
EMERALD HOME 60 LUX	60	100	200x360x150	4.4
EMERALD HOME 60 OFFICE	60	100*	260x995x324	14.3
EMERALD HOME 250 SPA	250	200	400x600x200	12.6

* Excluding water heating and cooling elements.



Antioxidant water
Emerald Home
(-150)...(-550) mV



Glacier water
(-50)...(-400) mV



Mother's milk
-70 mV



Orange juice
+50 mV



Green tea
+70 mV

One of the best antioxidants for people is pure antioxidant water enriched with hydrogen (catholyte).
Antioxidants found in foods, vitamins or dietary supplements do not give the desired effect
due to the large size of their molecules.*

* Antioxidant properties are characteristic of liquids with a negative oxidation-reduction potential (ORP) measured in millivolts (mV).



Bottled water
+200 mV



Coffee
+300 mV



Regular filtered water
+300 mV



Tap water
+350 mV



Sports drinks
+400 mV

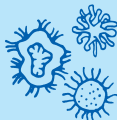













Sodas
+550 mV

Most traditional drinks are, in fact, oxidizing agents (having a positive ORP).
Their regular usage gradually acidifies and destroys the body at the cellular level.*

* ORP values of specified liquids may vary and differ from those stated in the tables.

DIFFERENT WATER TREATMENT TECHNOLOGIES COMPARISON

PURIFICATION METHOD	CRUTIAL WATER TREATMENT CRITERIA						
	 Destruction of microbes	 Removal of microbial toxins and biofilms	 Purification from organic compounds and heavy metals	 Purification from iron, manganese and hydrogen sulfide	 Taste and smell improvement	 Preservation of useful microelements	 Enrichment of water with molecular hydrogen
 Standard filters (mechanical and carbon)	-	-	-	-	+	+	-
 Reverse Osmosis (RO)	-	-	+	+	+	-	-
 Standard filters + UV lamps	+	-	-	-	+	+	-
 Reverse Osmosis + UV lamps	+	-	+	+	+	-	-
 Electro-chemical activation	+	+	+	+	+	+	+

EMERALD TURBO —

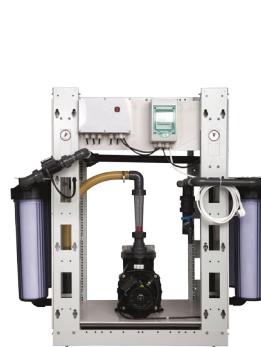
COMPLETE ON-SITE WATER DISINFECTION, PURIFICATION AND CONDITIONING.

EMERALD TURBO devices are designed for purification of fresh, brackish or sea water from microbes and biofilms, turbidity, color, odor, iron (including iron-oxidizing bacteria), manganese, hydrogen sulfide, heavy metals and harmful organic compounds (hormones, antibiotics, phenols, etc.).



EMERALD TURBO 1000

Capacity 1,000 l/h
Residential version



EMERALD TURBO 5000

Capacity 5,000 l/h
Swimming pool version



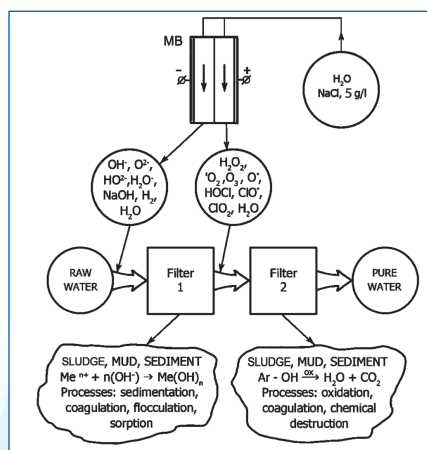
ADVANTAGES FOR DRINKING WATER PURIFICATION:

- Suitable for residences, apartment and office buildings, cafes, hotels, spas and fitness centers, industrial plants.
- Effective water pretreatment before RO.
- Suitable for different types of water: wells, rivers, lakes, seawater, sewage.
- Complete water disinfection with the destruction of biofilms.
- Removal of iron, manganese and hydrogen sulfide.
- Removal of harmful organic compounds, including hormones, antibiotics, anabolics, antidepressants, phenols and other pharmaceuticals.
- Elimination of color, turbidity and odor (the removal of humic acids, organic and bacterial iron, phenols and hydrogen sulfide).
- Removal of heavy metal ions by converting them into insoluble hydroxides with further mechanical filtration.

ADVANTAGES FOR SWIMMING POOL WATER PURIFICATION:

- The world's best technology for water disinfection by an environmentally friendly oxidant solution (hypochlorous acid, hydrogen peroxide, ozone, chlorine dioxide, singlet oxygen).
- The world's only technology capable of removing all biological effluvia from bathers' bodies (urine, sweat, blood, saliva, etc.) including epithelial cells in the swimming pool water.
- Reduction of hazardous chemical reagents usage: disinfectants, pH correctors, coagulants, flocculants, algicides.
- The formation of slime, mold, algae and biofilms is completely eliminated. No need for a complete cleaning of the pool associated with water drainage and seasonal shutdown of swimming pools.
- EMERALD TURBO installation doesn't require changes in the hydraulic scheme of the pool.
- There is no chlorine smell in the water, neither eye, nor skin irritation.

EMERALD TURBO technological scheme



- Cathode water treatment
- Mechanical filter
- Anode water treatment
- Mechanical filter

Summarized results of water treatment quality in laboratories in Russia, USA, UK, Czech Republic, India, Mexico, Lithuania, Latvia, Kazakhstan, Uzbekistan, Malta, Cyprus*

Disinfection of water at 300 colony-forming units (CFU) per 1 ml in source water, %	99.9999
Odor elimination at 20 °C, %	95–99
Anodic oxidation of divalent iron ions at their concentration in source water of 3 mg/l, %	90–99
Surfactants elimination at their concentration in source water of 3 mg/l, %	90–99
Permanganate index decrease at the initial level in source water of 10 mg/l, %	80–99
Heavy metals, iron hydroxides, manganese and hydrogen sulfide removal, %	80–99

* [Bakhr V. M., Panicheva S. A., Prilutsky V. I., Panichev V. G. ELECTROCHEMICAL ACTIVATION: INVENTIONS, SYSTEMS, TECHNOLOGY. M., 2021, ISBN 978-5-600-03153-1, 506–509 p.].

COMPLETED PROJECTS



Experimental water treatment in a 16 m³ pool using EMERALD TUBRO technology. In 30 hours purified water has absolute microbiological safety, perfect transparency and fresh smell. Russia, Vladimir region, 2023.



EMERALD TURBO 5000 provides complete swimming pool water purification and disinfection in a luxury spa center. No need for constant purchases of reagents for water treatment, perfect transparency of water, no chlorine smell. Russia, Moscow region, 2023.

Example of a typical EMERALD TURBO 1000 installation in a residence.

ECONOMIC FEASIBILITY OF EMERALD TURBO DEVICES

Basic criteria	Value	Notes
Purification cost of 1,000 liters of water	\$ 0.014	This figure is, on average, 10 times less than the cost of water treatment in industrial reverse osmosis (RO) systems. It takes on average only 100 watts of electricity, 5 grams of table salt (NaCl) and 1 liter of water to purify 1000 liters of fresh water.
No replaceable or fast-wearing parts	Yes	The main components are durable and resistant to wear and tear.
Average payback period (ROI)	2 years	
Average device lifespan	12 years	In total: 10 years of profit + preserving the Planet's ecology!

EMERALD TURBO DEVICES PRODUCT LINE

Model	Performance in disinfected drinking water, l/h	Maximum swimming pool volume, m ³	Power consumption, no more than, W	Table salt (NaCl) consumption per 1000 liters of purified water, grams	Dimensions, WxHxD, mm	Net weight, kg
EMERALD TURBO 1000	1,000	80	300	5	600x1300x500	42
EMERALD TURBO 5000	5,000	250	600	5	600x1600x600* 800x1200x600**	70* 80**
EMERALD TURBO 10000	10,000	500	1,200	5	600x1600x600* 800x1200x600**	70* 80**

* Dimensions and net weight of the electrochemical unit of the Device.

** Dimensions and net weight of the filtration unit of the Device.

EMERALD AQUACHLOR—

THE WORLD'S BEST WATER DISINFECTION TECHNOLOGY.

EMERALD AQUACHLOR devices synthesize from water and table salt a highly effective and safe mixed oxidant solution for the disinfection of drinking water, seawater, wastewater and swimming pool water in any place and quantity.

The composition of the oxidant solution is represented by chlorine in the most active form of hypochlorous acid (95–96%), chlorine dioxide (3–4%), ozone (0.5–1.0%), and hydroperoxide compounds (hydrogen peroxide, singlet oxygen) contained in microdroplets of moisture (0.2–0.5%). Each component of the oxidant solution is certified for drinking water disinfection.



EMERALD AQUACHLOR 2000

- Oxidants capacity (FAC*): 2 kg/hour (48 kg/day)
- Disinfects up to 48,000 m³ of water per day

*Free available chlorine



ADVANTAGES:

- Water disinfection expense is at least 1.5 times cheaper compared to chlorine (Cl₂), 3 times cheaper compared to sodium hypochlorite (NaOCl) and 10 times cheaper compared to ultraviolet (UV).
- Elimination of procurement, transportation and storage of disinfectants (including chlorine and sodium hypochlorite). Elimination of exclusion zones, reduced safety requirements.
- No chlorination by-products. No free volume of chlorine; all oxidants are dissolved in water.
- No corrosion of water pipes and no sludge formation in pipes.
- Prolonged disinfection effect in branched water distribution networks without the need for water ammonization.
- Destruction of biofilms on the inner surfaces of pipes, filter elements and storage tanks (the only solution in the world safe for humans and animals, capable of destroying biofilms).
- The absolute safety of AQUACHLOR devices has been confirmed by the German certificate body TÜV RHEINLAND.
- Possibility of chlorination dose reduction due to the high biocidal activity of the oxidant solution.
- Oxidant solution due to the synergy of the components has a disinfectant activity several times greater than chlorine and dozens of times greater than sodium hypochlorite.



Within 1 month of water disinfection with oxidant solution (instead of hydrogen peroxide), biofilms were removed from the inner surface of the tube.

Photo by BLUE SAFETY GmbH, Germany

Authorized agents for drinking water disinfection	Main advantages and disadvantages						
	Efficiency	Safety	Cost effectiveness	Ease of use	Prolonged effect	Low concentration of by products	Destruction of biofilms
AQUACHLOR (mixed oxidant solution)	YES	YES	YES	YES	YES	YES	YES
Gaseous chlorine	YES	NO	YES	NO	YES	NO	NO
Sodium hypochlorite	YES	YES	NO	NO	YES	NO	NO
Calcium hypochlorite	YES	YES	NO	NO	YES	NO	NO
Chlorine dioxide	YES	NO	NO	NO	YES	YES	NO
Ozone	YES	YES	NO	NO	NO	YES	NO
Ultraviolet	YES	YES	NO	YES	NO	YES	NO

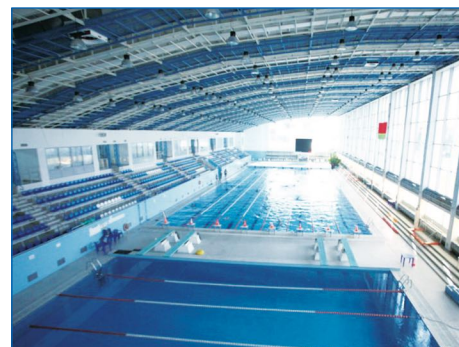
COMPLETED PROJECTS



76 units of AQUACHLOR 500 device have been disinfecting all drinking water in Balakovo City, Russia, since 2006. The devices produce more than 900 kg of oxidants per day in FAC* terms and disinfect 350,000 m³ per day.



5 units of AQUACHLOR 1000 devices in Aktau, Kazakhstan, have improved the quality of municipal wastewater disinfection and purification (16,000 m³ per day), operating on the new EMERALD TURBO technology. The total capacity of the devices is 120 kg per day of oxidant solution in FAC terms.



Water disinfection by an AQUACHLOR 500 device is used in a 2,500 m³ volume Olympic swimming pool in Minsk, Belarus. Purified water does not dry skin, does not irritate mucous membranes and is well tolerated by small children. No algae growth on the pool deck. No chlorine odor. No permanent pH adjustment is required.

ECONOMIC FEASIBILITY OF EMERALD AQUACHLOR DEVICES

Basic criteria	Values	Notes
Disinfection costs of 1 m ³ of water (at the chlorination rate of 1 g/liter)	\$ 0.000485	Water disinfection costs is at least 1.5 times cheaper compared to chlorine (Cl ₂), 3 times cheaper compared to sodium hypochlorite (NaOCl) and 10 times cheaper compared to ultraviolet (UV).
Power consumption per 1 kg of oxidants (FAC), no more than	4 kW	
Table salt consumption per 1 kg of oxidants (FAC), no more than	2 kg	
No replaceable or fast-wearing parts	Yes	The main components are durable and resistant to wear and tear.
Average production cost of 1,000 kg of oxidants (FAC)	\$ 485	At least 1.5 times less than the average cost of chlorine gas sold in cylinders and 2.5 times less than the cost of sodium hypochlorite in FAC terms.
Average payback period (ROI)	2 years	
Average device lifespan	12 years	In total: 10 years of profit + preserving the Planet's ecology!

EMERALD AQUACHLOR DEVICES PRODUCT LINE

Model	Oxidants capacity (FAC, Cl ₂), g/h	Caustic soda capacity (NaOH), g/h	Power consumption, no more than, W	Table salt consumption (NaCl), no more than, g/h	Dimensions, WxHxD, mm	Net weight, kg
EMERALD AQUACHLOR 250	250	283	1,200	500	600x1800x800	110
EMERALD AQUACHLOR 500	500	567	2,300	1,000	600x1800x800	120
EMERALD AQUACHLOR 1000	1,000	1,133	4,500	2,000	600x2000x750	130
EMERALD AQUACHLOR 1500	1,500	1,700	7,000	3,000	600x2000x1000	150
EMERALD AQUACHLOR 2000	2,000	2,260	9,000	4,000	700x2000x1150	170
EMERALD AQUACHLOR 3000	3,000	3,400	14,500	6,000	700x2000x1450	200

* FAC stands for Free available chlorine.

EMERALD STEL —

ON-SITE PRODUCTION OF ECOLOGICAL SANITIZER AND DETERGENT SOLUTION.

EMERALD STEL devices produce an all-purpose ecological mixed oxidants sanitizer Anolyte ANK SUPER and Catholyte detergent solution just from water and table salt at any place and quantity without any chemicals.



EMERALD STEL 20
Capacity: 20 liters/hour



EMERALD STEL 250
Capacity: 250 liters/hour



EMERALD STEL 1000
Capacity: 1 000 liters/hour

ADVANTAGES:

- Anolyte ANK SUPER (cost of 1 liter — \$ 0.003) can replace up to 90% of other chemicals for disinfection in medicine, agriculture, utilities, reducing the cost of disinfectants purchases by at least 80%.
- Anolyte ANK SUPER is a broad-spectrum disinfectant with a wide range of action (against bacteria, mycobacteria, viruses, fungi and spores of any species and forms), to which microflora is not able to adapt.
- The main active agents of Anolyte ANK SUPER are hypochlorous acid, hydrogen peroxide, chlorine dioxide, ozone and singlet oxygen.
- Anolyte ANK SUPER is harmless to humans and animals and can be used in any form of application (irrigation, immersion, wiping, soaking, fog, foam, ice).
- The use of Anolyte ANK SUPER for hospital disinfection is more than 5 times cheaper than traditional disinfectants and 33 times cheaper than hydrogen peroxide solution.
- Anolyte ANK SUPER is certified and recommended by the Russian Government against COVID-19.
- Catholyte is an electrochemically activated sodium hydroxide (NaOH) solution, formed in the process of Anolyte ANK SUPER synthesis and has highly effective detergent properties.

APPLICATION:

Disinfection of various objects in medicine, agriculture, water treatment, dentistry, veterinary medicine, food industry, housing and utilities, transportation.

DESINFECTATION RATES:

- Smooth surfaces, wiping: 0.2 liters of Anolyte ANK SUPER per 1 square meter.
- Air/containers, aerosol: 0.1 liter per 1 cubic meter volume.

COMPLETED PROJECTS

**STEL 250 device
at Multidisciplinary
Medical Center
Kommunarka,
Moscow, Russia.**

Capacity: 250 l/h
of Anolyte ANK SUPER
disinfectant



**STEL 250 device at
Multidisciplinary
Municipal Clinical
Hospital № 52,
Moscow, Russia.**

Capacity: 250 l/h
of Anolyte ANK SUPER
disinfectant



ANOLYTE ANK SUPER QUALITY INDICATORS

Parameter	Value
1) Total oxidants concentration in FAC terms, % (mg/l), no less than	0.05 (500)
2) Solution pH level, units	5.0-6.5
3) Total Dissolved Solids, ppm, no more than	1,000
4) Sporocidal activity duration of the solution, months	6

ANALYSIS OF HOSPITAL DISINFECTION COSTS USING VARIOUS DISINFECTANTS

Disinfectant	Cost of 1000 liters of working solution, USD	Cost of processing 1000 square meters, USD	Disinfectant costs per year, USD	Disinfectant costs per year differences compared to Anolyte, %
Chloramine B	12.5	2.5	25,000	90%
Bianol	7.4	1.1	11,111	78%
Hydrogen peroxide (3%)	41.7	8.3	83,333	97%
Anolyte ANK SUPER	2.8	0.3	2,500	

ECONOMIC FEASIBILITY OF EMERALD STEL DEVICES

Basic criteria	Values	Notes
Anolyte ANK SUPER 1 liter production costs	\$0.003	No more than 20 watts of electricity, 1 gram of table salt and 1 liter of water are used for the synthesis of 1 liter of Anolyte ANK SUPER
No replaceable or fast-wearing parts	Yes	The main components are durable and resistant to wear and tear.
Average payback period (ROI)	2 years	
Average device lifespan	12 years	In total: 10 years of profit + preserving the Planet's ecology!

EMERALD STEL DEVICES PRODUCT LINE

Model	Performance in Anolyte ANK SUPER, l/h	Oxidants concentration (FAC) in Anolyte ANK SUPER, no less than, mg/l	Power consumption, no more than, W	Table salt consumption (NaCl), no more than, g/h	Dimensions, WxHxD, mm	Net weight, kg
EMERALD STEL 20	20	500	488	25	300x400x220	8.5
EMERALD STEL 50	50	500	1,032	60	400x600x200	17
EMERALD STEL 100	100	500	450	100	600x1600x600	70
EMERALD STEL 250	250	500	600	250	600x1600x600	75
EMERALD STEL 500	500	500	1,200	500	800x1800x600	120
EMERALD STEL 1000	1,000	500	2,400	1,000	1000x1800x600	140

EMERALD ECOCHLOR—

SAFE CHLORINE GAS AND SODIUM HYDROXIDE SOLUTION AT ANY PLACE AND QUANTITY.

EMERALD ECOCHLOR devices are compact, environmentally friendly, high-performance modules for the on-site production of wet or dry chlorine gas under pressure and caustic soda solution by electrolysis of a sodium chloride (NaCl) solution.



EMERALD ECOCHLOR 3000

- Chlorine capacity: 3 kg/hour (72 kg/day).
- Sodium hydroxide capacity: 3.4 kg/hour (81.6 kg/day).
- Average power consumption: 11.2 kWh.

ADVANTAGES:

- Average production cost of 1,000 kg of chlorine gas is at least 1.5 times less than the average cost of chlorine gas sold in cylinders and 2.5 times less than the cost of sodium hypochlorite in FAC terms.
- EMERALD ECOCHLOR devices has a capacity from 0.25 to 3.0 kilograms of chlorine per hour producing wet or dry chlorine gas under pressure and caustic soda solution, eliminating the need for chlorine drying, transportation, storage, as well as the safety and security system for chlorine handling.
- Chlorine in any technology is used in a gaseous state, so ECOCHLOR devices of the required capacity will meet the needs of any enterprise with safe chlorine, yielding caustic soda solution as an additional valuable product.
- The devices do not fall under the licensed type of activity, excluding costs for ensuring industrial safety requirements.
- EMERALD ECOCHLOR devices don't have replaceable or fast-wearing parts eliminating maintenance costs for traditional membrane electrolyzers and regular replacement of NAFION polymer membranes.

APPLICATION:

- Chlorine consuming processes in chemical, mining, processing, pharmaceutical, food industries, water treatment, agriculture.
- At metallurgical and chemical enterprises for leaching of rare, non-ferrous and noble metals by hydrochlorination method from ores and wastes to extract gold, silver, copper, platinum, palladium. The advantage is the high chemical activity of chlorine at the time of its formation.
- In uranium mining and processing technology, including the intensification of uranium in-situ leaching (ISL) processes, regeneration of uranium ISL solutions and the use in liquid radioactive waste treatment technologies.
- To dissolve platinum group metals instead of the traditional technology using "aqua regia" (a mixture of concentrated nitric (HNO_3) and hydrochloric (HCl) acids), which eliminates the emissions of toxic nitrogen oxides into the atmosphere while obtaining an additional product - caustic soda.
- Yields a 15-20% caustic soda solution (NaOH), which is a valuable co-reagent and is used in various industries: textile, chemical, food, oil, etc.
- Production of 360 liters per day of 20% hydrochloric acid (HCl capacity of one EMERALD ECOCHLOR 3000 device).

COMPLETED PROJECTS



6 units of ECOCHLOR devices with a total chlorine capacity of 7 kg/h at chemical-pharmaceutical company Chemstar in Atlanta (USA). No need to dry, transport and store chlorine in cylinders for industrial processes.



One ECOCHLOR 500 device at a manufacturing plant in Miami (USA) for recovering of platinum, rhodium and palladium from spent automotive catalysts enabled recovery of up to 1 kg of platinum per day.



ECOCHLOR 3000 device in uranium ISL intensification processes allows to increase the uranium recovery rate from basic 70% to 96% using electrochemically activated sorption matrices, NAC Kazatomprom, Kazakhstan, 2022.

ECONOMIC FEASIBILITY OF EMERALD ECOCHLOR DEVICES

Basic criteria	Values	Notes
Production cost of 1,000 kg of chlorine	\$485	Average production cost is at least 1.5 times less than the average cost of chlorine gas sold in cylinders and 2.5 times less than the cost of sodium hypochlorite in FAC terms.
Power consumption per 1 kg of chlorine	3.5–4 kW	
Table salt consumption per 1 kg of chlorine	1.8–2 kg	
No replaceable or fast-wearing parts	Yes	The main components are durable and resistant to wear and tear.
Average payback period (ROI)	2 years	
Average device lifespan	12 years	In total: 10 years of profit + preserving the Planet's ecology!

EMERALD ECOCHLOR DEVICES PRODUCT LINE

Model	Chlorine gas capacity (Cl ₂), g/h	Caustic soda capacity (NaOH), g/h	Power consumption, no more than, W	Table salt consumption (NaCl), no more than, g/h	Dimensions, WxHxD, mm	Net weight, kg
EMERALD ECOCHLOR 250	250	283	1,200	500	600x1800x800	110
EMERALD ECOCHLOR 500	500	567	2,500	1,000	600x1800x800	120
EMERALD ECOCHLOR 1000	1,000	1,133	4,800	2,000	600x2000x750	130
EMERALD ECOCHLOR 1500	1,500	1,700	7,200	3,000	600x2000x1000	150
EMERALD ECOCHLOR 2000	2,000	2,260	9,000	4,000	700x2000x1150	170
EMERALD ECOCHLOR 3000	3,000	3,400	14,500	6,000	700x2000x1450	200



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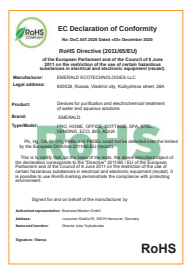
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CERTIFICATES



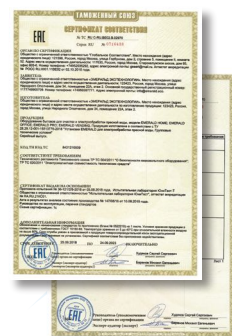
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