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Electrolyzed Water

http://en.wikipedia.org/wiki/Electrolyzed_water
Wikipedia

Electrolysed Water

Electrolysed water (EOW also known as electrolyzed oxidizing water, electro-activated water or electro-chemically activated water solution) is produced by the electrolysis of ordinary tap water containing dissolved sodium chloride.[1]

Creation process

The electrolysis occurs in a specially designed reactor which allows the separation of the cathodic and anodic solutions. In this process, hydrogen gas and hydroxide ions are produced at the cathode, leading to an alkaline solution that consists essentially of sodium hydroxide. At the anode, chloride ions are oxidized to elemental chlorine. If some of this chlorine is allowed to combine with some of the hydroxide ions produced at the cathode, it disproportionates into hypochlorous acid, a weak acid and an oxidizing agent. This "acidic electrolyzed water" can be raised in pH by mixing in the desired amount of hydroxide ion solution from the cathode compartment, yielding a solution of sodium hypochlorite NaOCl which is the major component of ordinary household laundry bleach. A solution whose pH is 7.3 will contain equal concentrations of hypochlorous acid and hypochlorite ion; reducing the pH will shift the balance toward the acid.

Efficient disinfectant

Both sodium hydroxide and hypochlorous acid are efficient disinfecting agents;[2] since relatively few microorganisms can tolerate acidic conditions, the acidic form of EOW is usually preferred for rinsing food-preparation surfaces, fruits and vegetables. Preparations sold for topical application to wounds are usually slightly alkaline.[citation needed]

Wound healing capabilities

Using a proprietary and non-cytotoxic formulation of oxychlorine compounds in a pH-neutral solution, Microcyn Technology, a commercially available electrolyzed water, provides a shelf life of 2 years and kills infection [3] without harming healthy tissue [4]. Oxychlorine compounds occur naturally in the human body as they are released by neutrophils, which are the most abundant type of white blood cells in humans and form an essential part of the immune system.

Research

Some promotions of EOW claim that it can act as an antioxidant food additive; however, both of the chlorine-containing components of EOW are active chemical oxidizing agents.[5]

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2. ^ <http://www.latimes.com/news/printedition/front/la-fi-magicwater23-2009feb23,0,6855069,full.story>
3. ^ <http://www.ocusis.com/us/news/articles/WoundMagazine012706.pdf>
4. ^ <http://www3.interscience.wiley.com/journal/117983759/abstract?CRETRY=1&SRETRY=0>
5. ^ Callaway, Chyi-Shen; Wu, Christ; Yeh, Jui-Yueh; Saalia, Firibu K. (2005). "The evaluation of electrolysed water as an agent for reducing micro-organisms on vegetables". *International Journal of Food Science and Technology* 40: 495–500.

<http://www.chem1.com/CQ/ionbunk.html>

The Bottom Line

"Here, in a nutshell, are a few basic facts that I believe anyone with a solid background in chemistry or physiology would concur with:

- * "Ionized water" is nothing more than sales fiction; the term is meaningless to chemists.
- * Pure water (that is, water containing no dissolved ions) is too uncondutive to undergo significant electrolysis by "water ionizer" devices.
- * Pure water can never be alkaline or acidic, nor can it be made so by electrolysis. Alkaline water must contain metallic ions of some kind — most commonly, sodium, calcium or magnesium.
- * The idea that one must consume alkaline water to neutralize the effects of acidic foods is ridiculous; we get rid of excess acid by exhaling carbon dioxide.
- * If you do drink alkaline water, its alkalinity is quickly removed by the highly acidic gastric fluid in the stomach.
- * Uptake of water occurs mainly in the intestine, not in the stomach. But when stomach contents enter the intestine, they are neutralized and made alkaline by the pancreatic secretions — so all the water you drink eventually becomes alkaline anyway.
- * The claims about the health benefits of drinking alkaline water are not supported by credible scientific evidence.
- * There is nothing wrong with drinking slightly acidic waters such as rainwater. "Body pH" is a meaningless concept; different parts of the body (and even of individual cells) can have widely different pH values. The pH of drinking water has zero effect on that of the blood or of the body's cells.
- * If you really want to de-acidify your stomach (at the possible cost of interfering with protein digestion), why spend hundreds of dollars for an electrolysis device when you can take calcium-magnesium pills, Alka-Seltzer or Milk of Magnesia?
- * Electrolysis devices are generally worthless for treating water for health enhancement, removal of common impurities, disinfection, and scale control. Claims that "ionized" waters are antioxidants are untrue; hypochlorites (present in most such waters) are in fact oxidizing agents..." &c...

<http://boingboing.net/2009/02/23/electrolyzed-water-a.html> -- Michigan jailers mop with electrolyzed water to keep potentially lethal cleaners out of the hands of inmates. ...

<http://www.sanyo.com/news/2007/01/17-1en.html> -- SANYO has provided numerous products using its unique electrolyzed water technology Inactivating Mechanism of Norovirus through electrolyzed water ...

<http://www.electrolyzercorp.com/company/FAQ.html>

Our electrolyzed water technology converts tap water into a disinfectant ... A. Electrolyzed water is the

result of a process known as electrolyzation. ...

<http://www.sciencedaily.com/releases/2000/08/000825082333.htm>

Electrolyzed water rivals chlorine and heat for killing ... One advantage of using electrolyzed water to kill bacteria on food ...

<http://www.foodproductiondaily.com/Quality-Safety/Electrolyzed-water-effective-as-chemical-cleaner-study-finds>

Scientific tests confirm that electrolyzed oxidizing water can replace the chemicals used for cleaning equipment in the food industry.

<http://www.reuters.com/article/pressRelease/idUS153428+16-Apr-2008+PRN20080416>

Electrolyzed Water Gives Boost to Eliminating Food-Borne Bacteria Such as Salmonella, E. coli and Listeria Murray's Chicken to be First ...

<http://www.latimes.com/business/la-fi-magicwater23-2009feb23,0,821096,full.story>

Los Angeles Times (23 Feb 2009)

Electrolyzed water cleans, degreases -- and treats athlete's foot.

The solution is replacing toxic chemicals.

by

Marla Dickerson

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February 23, 2009

It's a kitchen degreaser. It's a window cleaner. It kills athlete's foot. Oh, and you can drink it.

Sounds like the old "Saturday Night Live" gag for Shimmer, the faux floor polish plugged by Gilda Radner. But the elixir is real. It has been approved by U.S. regulators. And it's starting to replace the toxic chemicals Americans use at home and on the job.

The stuff is a simple mixture of **table salt** and tap water whose ions have been scrambled with an electric current. Researchers have dubbed it electrolyzed water -- hardly as catchy as Mr. Clean. But at the Sheraton Delfina in Santa Monica, some hotel workers are calling it el liquido milagroso -- the miracle liquid.

That's as good a name as any for a substance that scientists say is powerful enough to kill anthrax spores without harming people or the environment.

Used as a sanitizer for decades in Russia and Japan, it's slowly winning acceptance in the United States. A New York poultry processor uses it to kill salmonella on chicken carcasses. Minnesota grocery clerks spray sticky conveyors in the checkout lanes. Michigan jailers mop with electrolyzed water to keep potentially lethal cleaners out of the hands of inmates.

In Santa Monica, the once-skeptical Sheraton housekeeping staff has ditched skin-chapping bleach and pungent ammonia for spray bottles filled with electrolyzed water to clean toilets and sinks.

"I didn't believe in it at first because it didn't have foam or any scent," said housekeeper Flor Corona. "But I can tell you it works. My rooms are clean."

Management likes it too. The mixture costs less than a penny a gallon. It cuts down on employee injuries from chemicals. It reduces shipping costs and waste because hotel staffers prepare the elixir on site. And it's helping the Sheraton Delfina tout its environmental credentials to guests.

The hotel's kitchen staff recently began disinfecting produce with electrolyzed water. They say the lettuce lasts longer. They're hoping to replace detergent in the dishwasher. Management figures the payback time

for the \$10,000 electrolysis machine will be less than a year.

"It's green. It saves money. And it's the right thing to do," said Glenn Epstein, executive assistant at the Sheraton Delfina. "It's almost like fantasy."

Actually, it's chemistry. For more than two centuries, scientists have tinkered with electrolysis, the use of an electric current to bring about a chemical reaction (not the hair-removal technique of the same name that's popular in Beverly Hills). That's how we got metal electroplating and large-scale production of chlorine, used to bleach and sanitize.

It turns out that zapping salt water with low-voltage electricity creates a couple of powerful yet nontoxic cleaning agents. Sodium ions are converted into **sodium hydroxide**, an alkaline liquid that cleans and degreases like detergent, but without the scrubbing bubbles. Chloride ions become **hypochlorous acid**, a potent disinfectant known as acid water.

"It's 10 times more effective than bleach in killing bacteria," said Yen-Con Hung, a professor of food science at the University of Georgia-Griffin, who has been researching electrolyzed water for more than a decade. "And it's safe."

There are drawbacks.

Electrolyzed water loses its potency fairly quickly, so it can't be stored long. Machines are pricey and geared mainly for industrial use. The process also needs to be monitored frequently for the right strength.

Then there's the "magic water" hype that has accompanied electrolyzed drinking water. A number of companies sell so-called ionizers for home use that can range from about \$600 to more than \$3,000. The alkaline water, proponents say, provides health benefits.

But Richard Wullaert, a Santa Barbara consultant, said consumers should be careful.

"Some of these people are making claims that will get everybody in trouble," said Wullaert, whose nonprofit Functional Water Society is spreading the word about electrolyzed water. "It's time for some serious conferences with serious scientists to give this credibility."

Most of the growth has happened outside the United States.

Russians are putting electrolyzed water down oil wells to kill pesky microbes. Europeans use it to treat burn victims. Electrolyzing equipment is helping to sanitize drinking water in parts of Latin American and Africa.

It's big in Japan. People there spray it on sushi to kill bacteria and fill their swimming pools with it, eliminating the need for harsh chlorine. Doctors use it to sterilize equipment and treat foot fungus and bedsores. It's the secret weapon in Sanyo Electric Corp.'s "soap-less" washing machine.

Now Sanyo is bent on cleaning up Japan's taxis with a tiny air purifier that fits into a car's cup holder. The device uses electrolyzed water to shield passengers from an unwelcome byproduct of Japan's binge-drinking business culture: vomit.

"There was some concern about the spreading of viruses and bacteria via the taxi, not to mention the . . . stinky smells," Sanyo spokesman Aaron Fowles said.

Sanyo's taxi air washer isn't yet available in the U.S.; commuters will have to hold their noses for now. But the U.S. Department of Agriculture, the Food and Drug Administration and the Environmental Protection Agency have approved electrolyzed water for a variety of uses.

PuriCore of Malvern, Pa., and **Oculus Innovative Sciences** of Petaluma, Calif., have developed treatments for chronic wounds. Albuquerque, N.M.-based **MIOX Corp.** sells municipal water-purifying systems. **EAU Technologies Inc.** of Kennesaw, Ga., caters to both ends of a dairy cow, with alkaline water to aid the animal's digestion and acid water to clean up its manure.

Integrated Environmental Technologies Inc. of Little River, S.C., is working with oil companies to

keep wells free of bacteria and with high schools to sanitize sweaty wrestling mats and grungy football equipment that spread skin infections.

Electrolyzer Corp. of Woburn, Mass., is going after the hospitality market. The Sheraton Delfina purchased one of its machines. So has the Hyatt Regency Chicago and the Trump International Beach Resort near Miami.

Patrick Lucci, Electrolyzer's vice president of marketing, likes to bombard prospects with scientific studies, then give 'em the old razzle-dazzle. He'll swig the processed salt water before he mops the floor with it.

"Try that with bleach," he said.

The unit in Santa Monica looks a little like an oversized water heater, with two tanks side by side -- one for making the hypochlorous acid sanitizer, the other for the sodium hydroxide cleanser.

Rebecca Jimenez, director of housekeeping, heard grumbling from the cleaning staff when the hotel brought the machine in last fall. Housekeepers doubted that the flat, virtually odorless liquids were really doing the job. Some poured the guest shampoos into their bottles to work up a lather.

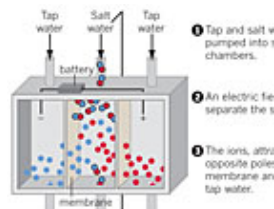
"If it doesn't suds up, it doesn't work," Jimenez said. "That's the mentality."

Still, she said, most have come around and are enjoying working without fumes and peeling skin.

Minnesota food scientist Joellen Feirtag said she was similarly skeptical. So she installed an electrolysis unit in her laboratory and began researching the technology. She found that the acid water killed E. coli, salmonella, listeria and other nasty pathogens. Yet it was gentle enough to soothe her children's sunburns and acne.

She's now encouraging food processors to take a look at electrolyzed water to help combat the disease outbreaks that have roiled the industry. Most are dubious.

"This sounds too good to be true, which is really the biggest problem," said Feirtag, an associate professor at the University of Minnesota. "But it's only a matter of time before this becomes mainstream."



<http://www.puricore.com/>

About PuriCore

PuriCore is a life sciences company focused on developing and commercializing proprietary products that safely, effectively, and naturally kill contagious pathogens. These products address major public health threats of M. tuberculosis, MRSA, E.coli, norovirus, avian influenza, HIV, polio virus, Helicobacter pylori, and Legionella.

Our products generate hypochlorous acid, the same natural anti-microbial produced by the human body to fight pathogens. Hypochlorous acid is highly effective in killing all types of bacteria, viruses, and fungal spores.

Wound Care * Vashe Wound Therapy is a biocompatible solution to enhance the clinical management of acute and chronic wounds in tandem with the body's natural defenses. It is a safe and effective alternative to common wound irrigants that inhibit wound healing. * A breakthrough in science for wound cleansing and debridement * An additional boost to the body's own defense * Provides key assistance to the body's own natural wound recovery

Potential Benefits * Reduced length of stay * Improved clinical outcomes * Patient satisfaction * Practice builder

http://www.puricore.com/markets_wound_gallery.aspx

Hypochlorous Acid, the Body's Own Natural Antimicrobial -- This video covers the science behind hypochlorous acid, one of the human body's most powerful defense mechanisms. You'll learn how the human body addresses infectious pathogens through phagocytosis and the oxidative burst.

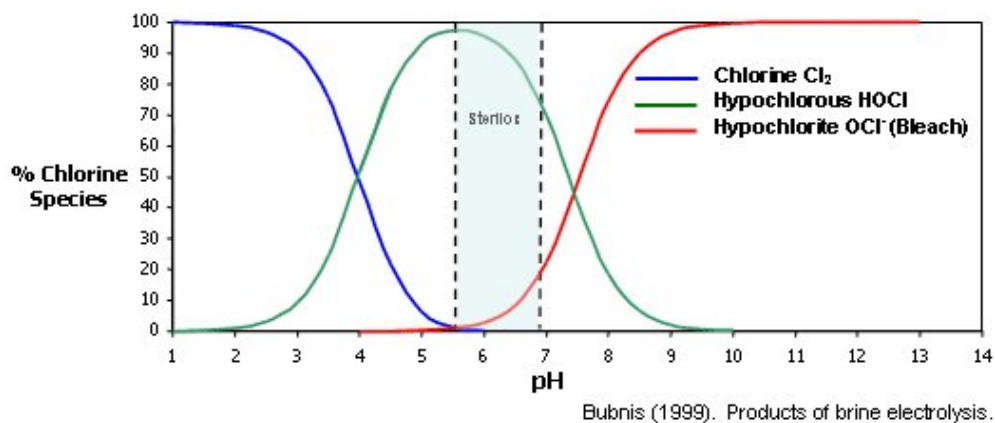
http://www.puricore.com/technology_works.aspx

How Our Technology Works

PuriCore's proprietary technology mimics the production by the human immune system of the body's natural anti-microbial by generating hypochlorous acid. Under a variety of brands including Sterilox, Aqualox, and Aquatine EC, PuriCore's Systems electrochemically generate hypochlorous acid solutions for customers at a range of concentrations to meet the needs of each application. Requiring only common salt, water, and electricity, these systems are reliable, safe, effective, and user-friendly. Because hypochlorous acid does not have a prolonged shelf life, our systems produce the solutions on-site and on-demand.

Each PuriCore System includes a combination of proprietary electrolysis cells, software, and control systems within a custom-designed unit. These proprietary control systems ensure that the optimal concentration of hypochlorous acid is produced consistently and reliably within narrow specification tolerances. The hypochlorous acid solution produced is at near neutral pH (between 5 and 7), optimizing its biocidal efficacy, yet remaining completely safe to humans and the environment. (Below pH 4, the solution is aqueous chlorine; above pH 7.4, the Solution is hypochlorite, the chemical in common bleach.)

PuriCore's Systems can be remotely monitored and incorporate a series of internal controls to ensure that only effective hypochlorous acid solution is available for use.



http://www.puricore.com/technology_library.aspx

PuriCore Science Library

If you would like a copy of our complete bibliography for Sterilox Solutions, electrolysis chemistry, mode of action of hypochlorous acid, and the role of hypochlorous acid in immune response, please contact us.

Videos -- Sterilox "Microbiological Efficacy in Action" video

Presentations and Posters --

Patent Applicant: PURICORE INC

GB2452220

Electrochemical Treatment of an Aqueous Solution

Inventor: BELLAMY MARTIN
Applicant: PURICORE INC [US]
2009-02-25

Abstract -- This invention relates to an apparatus and method for producing an output solution having a predetermined level of available free chlorine including two or more parallel production lines. Each production line includes an electrolytic cell, means for passing a saline solution having a substantially constant chloride ion concentration through the cell, means for applying a substantially constant current across the cell, and means for dispensing output solution from the cell.

EP1986952

METHODS OF TREATING CYSTIC FIBROSIS

Inventor: BOSCH GREGORY [US] ; SAMPSON CLAIRE
Applicant: PURICORE INC [US]
2008-11-05
Also published as: WO2007101068

Abstract -- A method of treating and/or managing cystic fibrosis in a patient by administering an electrolyzed saline solution containing hypohalous acid. Preferably, the hypohalous acid is hypochlorous acid. Also provided is a method of treating and/or managing cystic fibrosis by administering an electrolyzed saline solution at specific pHs such as between 5.0 and 6.2. The present invention also provides a method of administering an electrolyzed saline solution for treating and/or managing cystic fibrosis using a combined electrochemical generator and a vaporizer, humidifier or fogger. Combination therapies are also provided.

EP1959972

METHOD OF TREATING OPEN WOUNDS USING HYPOCHLOROUS ACID

Inventor: SELKON JOE
Applicant: PURICORE INC [US]
2008-08-27
Also published as: WO2007070637

Abstract -- Methods for treating open wounds, such as chronic refractory open wound, by administering an electrolyzed saline solution comprising hypochlorous acid are provided. Method of alleviating the pain associated with open wounds by administering an electrolyzed saline solution are also provided. Combination treatment methods are also provided where an electrolyzed saline solution is administered subsequent to or concurrently with standard compression bandaging.

WO2008089268

METHODS AND COMPOSITIONS FOR TREATING CONDITIONS ASSOCIATED WITH INFECTION AND/OR INFLAMMATION

Inventor: GOLDAN KEITH [US] ; SAMPSON CLAIRE [US]
Applicant: PURICORE INC [US] ; GOLDAN KEITH [US] (+1)
2008-07-24
Also published as: WO2008089268

Abstract -- The present invention provides methods and compositions for treating and preventing

conditions characterized by infection and/or inflammation, especially of the eyes, ears, nose, and/or throat. The methods of the invention involve administering hypochlorous acid to the patient, such as in the form of a composition described herein.

US2008160612

TREATMENT OF INFECTED TISSUES WITH HYPOCHLOROUS ACID

Inventor: SELKON JOE

Applicant: PURICORE INTERNAT LTD

2008-07-03

Also published as: WO0113926 (A2) // WO0113926 (A3) // US2004208940 (A1) // US7276255 (B2) // US2002182262

Abstract -- Super-oxidized water based on hypochlorous acid, such as is obtained by the electrochemical treatment of a saline solution, may be used in the treatment of leg ulcers or other open wounds. Preferably, the pH of the super-oxidized water is in a range of 4 to 7, and the water has a redox potential of >950 mV. Medicaments based on the super-oxidized water may be in liquid or gel form. The super-oxidized water is able to control the microbial population within the wound and at the same time permit cell proliferation.

US2008156674

APPARATUSES AND SYSTEMS FOR STORING, DISPENSING, AND RECONSTITUTING MATERIALS

Inventor: CORREALE DAVID [US] ; FISCHER MICHAEL

Applicant: PURICORE INC [US]

2008-07-03

Also published as: WO2008058249

Abstract -- The present invention is directed to apparatuses and systems for storing, dispensing, and reconstituting materials. Apparatuses may comprise a container to store a material having an open end and a dispensing aperture. A cover may be configured to seal the open end of the container and a sleeve can include a passageway to slidably receive the container. The container may be moveable within the sleeve between a storing position wherein the dispensing aperture is covered and a dispensing position wherein the dispensing aperture is uncovered to dispense the material. Systems may additionally comprise a reservoir having an opening and the sleeve configured for mounting on the reservoir opening so that when the container is moved to the dispensing position the material is dispensed into the reservoir to form a reconstituted material.

DE60036582

Electrochemical Treatment of an Aqueous Solution

Inventor: BUCKLEY ALAN [GB] ; BELLAMY MARTIN

Applicant: PURICORE INTERNAT LTD [GB]

2008-06-26

Also published as: EP1074515 (A2) // EP1074515 (A3) // EP1074515 (B1) // US6632347 (B1) // CA2315355

Abstract -- A method and apparatus for the electrochemical treatment of an aqueous solution in an electrolytic cell is described. Output solution having a predetermined level of available free chlorine is produced by applying a substantially constant current across the cell between an anode and a cathode while passing a substantially constant throughput of chloride ions through the cell.

WO2008040020

APPARATUS AND METHOD FOR WOUND, CAVITY, AND BONE TREATMENT

Inventor: NIEZGODA JEFFREY [US] ; CORREALE DAVID

Applicant: PURICORE INC [US] ; NIEZGODA JEFFREY

2008-04-03

Also published as: WO2008040020

Abstract -- The present invention provides a treatment apparatus. The apparatus contains a reservoir or generator for a treatment solution, a mechanism for delivering the treatment solution to a wound site, and a mechanism for applying the solution to a wound, tissue, bone or surgical cavity for treatment. The apparatus may apply the solution (e.g., a solution containing hypohalous acid) with, for example, an occlusive wound dressing, pulsative lavage device, hydrotherapy, hydrosurgical device, and/or ultrasound. A waste container may be operably connected to the apparatus for collecting waste from the wound by run-off, or by applying negative pressure (e.g. a vacuum). Because the apparatus of the invention can optionally be portable or mobile, the invention is suitable for use in hospitals and nursing homes, as well as for home wound care.; The invention also provides a method for treating a wound (or other area needing treatment), and/or for reducing wound bioburden, by supplying a hypochlorous acid solution to the site, such as a wound colonized or infected with drug resistant bacteria, before, during, or after negative pressure wound therapy.

US2008075832

COATED MEDICAL DEVICES AND METHODS OF MAKING SAME

Inventor: ABI AOUN WALID

Applicant: PURICORE INC [US]

2008-03-27

Also published as: WO2008021948

Abstract -- Methods of protecting an insertable medical device from chemical degradation are provided. Methods include coating the insertable medical device with an acrylic layer and then coating the acrylic layer with an acrylic-grafted fluoropolymer. Medical devices coated with oxidation-resistant coatings are also provided.

EP1878704

Electrochemical Treatment of an Aqueous Solution

Inventor: BUCKLEY ALAN [GB] ; BELLAMY MARTIN

Applicant: PURICORE EUROP LTD [GB]

2008-01-16

Abstract -- A method and apparatus for the electrochemical treatment of an aqueous solution in an electrolytic cell is described. Output solution having a predetermined level of available free chlorine is produced by applying a substantially constant current across the cell between an anode and a cathode while passing a substantially constant throughput of chloride ions through the cell.

US2007108064

Solution having Biocidal Activity

Inventor: BUCKLEY ALAN [GB] ; POPOV ALEXEY

Applicant: PURICORE EUROP LTD [GB]

2007-05-17

Abstract -- A method and apparatus for the electrochemical treatment of an aqueous solution in an electrolytic cell is described. Output solution having a predetermined level of available free chlorine is produced by applying a substantially constant current across the cell between an anode and a cathode while passing a substantially constant throughput of chloride ions through the cell.

US7422668

Electrochemical Cells

Inventor: CROSS DAVID

Applicant: PURICORE INTERNATIONAL LIMITED

2006-06-15

Also published as: // GB2391018 // GB2391018 // JP2005533926 // WO2004009498

Abstract -- An electrochemical cell has an inner, titanium-rod electrode (1) mounted coaxially within an outer, titanium-tube electrode (2) with a porous, ceramic tube (3) mounted coaxially between them to define coaxial, annular passageways (4,5) for liquid flow in separate streams lengthwise of the cell between respective pairs of inlet/outlet ports (6, 6; 7, 7). A cup-shape fitting (8) having a stepped-down internal diameter is clamped onto the rod electrode (1) at each end of the cell, with the tubular electrode (2) at that end held tightly sealed in the mouth (14) of the fitting (8).; Each end of the ceramic tube (3) projects into the larger-diameter cavity-part (10) of the fitting (8) at that end and has a radial flange (17) that provides a sliding seal within this cavity-part (10) for keeping the inlet/outlet ports (6,7) for the respective liquid streams at that end, divided off from one another as well as allowing the ceramic tube (3) limited freedom for longitudinal sliding relative to the electrodes (1, 2).

US7303660

Electrochemical Treatment of an Aqueous Solution

Inventor: BUCKLEY ALAN [GB] ; POPOV ALEXEY YUREVICH

Applicant: STERIOX MEDICAL EUROP LTD [US]

2004-04-01

Abstract -- A method and apparatus are provided for the electrochemical treatment of an aqueous solution in an electrolytic cell. Output solution having a predetermined level of available free chlorine is produced by applying a substantially constant current across the cell between an anode and a cathode while passing a substantially constant throughput of chloride ions through the cell.

<http://www.oculusis.com/>

About Oculus

Oculus Innovative Sciences is a biopharmaceutical company that develops, manufactures and markets a family of products based upon the shelf-stable Microcyn® Technology platform, which is intended to help prevent and treat infections in chronic and acute wounds. The Microcyn Technology platform enables the creation of a biocompatible solution containing active oxychlorine compounds. The solutions derived from the shelf-stable Microcyn Technology platform have demonstrated, in a variety of research and investigational studies, the ability to treat a wide range of pathogens, including antibiotic-resistant strains of bacteria (including MRSA and VRE), viruses, fungi and spores. The technology has also demonstrated wound healing in chronic and acute wounds in clinical investigational studies. It has been commercialized outside of the United States for the treatment of infected wounds.

Oculus' principal operations are in Petaluma, California, and it conducts operations in Europe, Latin America and Japan through its wholly owned subsidiaries, Oculus Innovative Sciences

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<http://www.oculusis.com/us/technology/ip.php>

Intellectual Property

To date, Oculus has been issued 11 patents for the Microcyn Technology. As well, there are 88 patents pending. Since 1995, the patent term in the United States is 20 years from the earliest claimed filing date. Our issued U.S. patent was filed on September 13, 2002. As well, there are 33 patents pending; 13 in the United States and 20 foreign. Patent Applicant : Oculus Innovative Sciences

Pertinent European Patent Office Search Results :

<http://v3.espacenet.com>

MX2007011709

METHOD OF TREATING SKIN ULCERS USING OXIDATIVE REDUCTIVE POTENTIAL WATER SOLUTION

Inventor: ALIMI HOJABR [US] ; GUTIERREZ ANDRES

Applicant: OCULUS INNOVATIVE SCIENCES INC

2007-12-11

Also published as : WO2006102680 // WO2006102681

Abstract -- Provided is a method of treating skin ulcers and related complications in patients by administering an oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours.

MX2007013774

METHOD OF USING OXIDATIVE REDUCTIVE POTENTIAL WATER SOLUTION IN DENTAL APPLICATIONS

Inventor: ALIMI HOJABR

Applicant: OCULUS INNOVATIVE SCIENCES INC [US]

2008-01-29

Abstract -- Methods of using oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours in dental applications are provided. The ORP water solution can be administered to patients for the routine disinfection of the oral cavity as part of an on-going program of oral hygiene. The ORP water solution can further be used to irrigate and/or disinfect oral tissues and surfaces during dental procedures, oral surgery, or maxillo-facial surgery. Also, the ORP water solution can be administered to treat patients with damage to the oral tissues caused by

disease or surgery.

KR20080093135

**METHODS OF TREATING OR PREVENTING PERITONITIS WITH OXIDATIVE
REDUCTIVE POTENTIAL WATER SOLUTION**

**Inventor: ALIMI HOJABR [US] ; GUTIERREZ ANDRES [MX] Applicant: OCULUS
INNOVATIVE SCIENCES INC [US]
2008-10-20**

Abstract -- Provided is a method for preventing or treating inflammation and associated states (e.g. infection, hypersensitivity, pain) by administering a therapeutically effective amount of an oxidative reduction potential (ORP) water solution that is stable for at least about twenty-four hours. The ORP water solution administered in accordance with the invention can be combined with one or more suitable carriers and can be administered in conjunction with one or more additional therapeutic agents.

WO2008112940

**ANTIMICROBIAL SOLUTIONS CONTAINING DICHLORINE MONOXIDE AND METHODS
OF MAKING AND USING THE SAME**

**Inventor: NORTHEY ROBERT [US]
Applicant: OCULUS INNOVATIVE SCIENCES INC [US] ; NORTHEY ROBERT
2008-09-18**

Abstract -- Methods and products are provided for treating a wound or infection in a mammal or disinfecting a surface with a hypochlorous acid solution that has been activated by a catalyst. Additionally provided is a process for preparing an antimicrobial product that produces an activated hypochlorous acid solution for use as an antimicrobial.

CN101163492

Method of treating skin ulcers using oxidative reductive potential water solution

**Inventor: HOJABR ALIMI [US] ; ANDRES GUTIERREZ
Applicant: OCULUS INNOVATIVE SCIENCES INC 2008-04-16**

DE60035016

Active oxygen containing solution for promoting growth of tissue cells at wound sites

**Inventor: YAHAGI NAOKI [JP] ; SUMITA OSAO
Applicant: OCULUS INNOVATIVE SCIENCES INC
2008-01-17**

Abstract -- A tissue cell growth-promoting solution manufactured using this invention will comprise water containing active oxygen as a prime ingredient. When the solution is applied to an internal or external wound, it supplies active oxygen originating from outside the biobody to supplement the active oxygen produced by the biobody's own protective system cells (such as neutrophils and macrophages) which gather at the wound site. The solution thus increases the concentration of active oxygen at the site of the wound, a state mimicking one in which a large

quantity of such biosignals is secreted by the biobody itself.; The tissue cell growth-promoting solution described herein promotes the reconstruction of tissues, a process that corresponds to the last of the four main steps involved in wound healing biochemical processes of "blood vessel reaction", "blood vessel coagulation", "inflammation", "reconstruction of tissues" and which would otherwise have to rely on the natural healing power of the biobody itself.

DE60218256

Electrolytic cell for producing charged anode water suitable for surface cleaning or treatment, and method for producing the same and use of the same

Inventor: SUMITA OSAO

Applicant: OCULUS INNOVATIVE SCIENCES INC [US]

2007-10-31

Abstract -- The present invention provides an electrolytic cell, which can efficiently produce, charged water having an excellent performance of improving surface cleaning or treatment of an object, e.g., semiconductor, glass, or resin and of cleaning and sterilizing medical device. <?? >The electrolytic cell of the present invention is for producing charged anode water suitable for surface cleaning or treatment, including the cathode chamber 41 and anode chamber 50, fluorinated cation-exchange membrane 46 provided to separated these chambers from each other, cathode 44 closely attaché to the cation-exchange membrane 45 on the side facing the cathode chamber 41, and middle chamber 48 filled with the cation-exchange resin 46, provided on the other side of The cation-exchange membrane 46,; the cation-exchange resin 46 being arranged in such a way to come into contact with the fluorinated cation-exchange membrane 45, wherein the feed water is passed into the middle chamber 48 and passed thorough The anode chamber 50 to be recovered as the charged anode water.

US2007196434

Methods of preventing or treating sinusitis with oxidative reductive potential water solution

Inventor: ALIM HOJABR [US] ; GUTIERREZ ANDRES

Applicant: OCULUS INNOVATIVE SCIENCES INC

2007-08-23

Abstract -- Provided is a method for preventing or treating sinusitis by administering a therapeutically effective amount of an oxidative reduction potential (ORP) water solution that is stable for at least about twenty-four hours. The ORP water solution administered in accordance with the invention can be combined with one or more suitable carriers. The ORP water solution can be administered alone or, e.g., in combination with one or more additional therapeutic agents.

US2007196357

Methods of treating or preventing inflammation and hypersensitivity with oxidative reductive potential water solution

Inventor: ALIM HOJABR [US] ; GUTIERREZ ANDRES

Applicant: OCULUS INNOVATIVE SCIENCES INC

2007-08-23

Abstract -- Provided is a method for preventing or treating inflammation and associated states (e.g.

infection, hypersensitivity, pain) by administering a therapeutically effective amount of an oxidative reduction potential (ORP) water solution that is stable for at least about twenty-four hours. The ORP water solution administered in accordance with the invention can be combined with one or more suitable carriers and can be administered in conjunction with one or more additional therapeutic agents.

US2007173755

Methods of Treating or Preventing Peritonitis with Oxidative Reductive Potential water solution

Inventor: ALIMI HOJABR [US] ; GUTIERREZ ANDRES

Applicant: OCULUS INNOVATIVE SCIENCES INC

2007-07-26

Abstract-- Provided is a method for treating or preventing peritonitis by administering a therapeutically effective amount of an oxidative reduction potential (ORP) water solution that is stable for at least about twenty-four hours. The ORP water solution administered in accordance with the invention can be combined with one or more suitable carriers and can be administered in conjunction with one or more additional therapeutic agents. Further provided is a method for preventing peritoneal hemorrhage, adhesions and abscesses.

WO 2005065383 // KR20070015123

OXIDATIVE REDUCTIVE POTENTIAL WATER SOLUTION, PROCESSES FOR PRODUCING SAME AND METHODS OF USING THE SAME

Inventor: ALIMI HOJABR

Applicant: OCULUS INNOVATIVE SCIENCES INC

2007-02-01

Abstract -- Provided is an oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours and methods of using the solution. The present invention provides a method of preventing or treating a condition in a patient, which method comprises administering a therapeutically effective amount of the ORP water solution. Additionally provided is a method of treating impaired or damaged tissue, which method comprises contacting the tissue with a therapeutically effective amount of the ORP water solution. Further provided is a method of disinfecting a surface, which method comprises contacting the surface with an anti-infective amount of the ORP water solution. A process for producing an ORP water solution is also provided.

US2006253060

Method of using Oxidative Reductive Potential Water Solution in Dental Applications

Inventor: ALIMI HOJABR [US]

Applicant: OCULUS INNOVATIVE SCIENCES INC

2006-11-09

Abstract -- Methods of using oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours in dental applications are provided. The ORP water solution can be administered to patients for the routine disinfection of the oral cavity as part of an on-going program of oral hygiene. The ORP water solution can further be used to irrigate and/or disinfect oral tissues and surfaces during dental procedures, oral surgery, or maxillo-facial surgery. Also, the

ORP water solution can be administered to treat patients with damage to the oral tissues caused by disease or surgery.

US2006241546

Method of Treating Second and Third Degree Burns using oxidative reductive potential water solution

Inventor: ALIMI HOJABR

Applicant: OCULUS INNOVATIVE SCIENCES INC

2006-10-26

Abstract -- A method of treating burns, preferably second and third degree burns, by administration of an oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours is provided.

US2006235350

Method of Treating Skin Ulcers using oxidative reductive potential water solution

Inventor: ALIMI HOJABR [US] ; GUTIERREZ ANDRES

Applicant: OCULUS INNOVATIVE SCIENCES INC

2006-10-19

Abstract -- Provided is a method of treating skin ulcers and related complications in patients by administering an oxidative reduction potential (ORP) water solution that is stable for at least twenty-four hours.

CN1845877

Oxidative reductive potential water solution, processes for producing same and methods of using the same

Inventor: HOJABR ALIMI

Applicant: OCULUS INNOVATIVE SCIENCES INC [US]

2006-10-11

US2005142157

Oxidative reductive potential water solution and methods of using the same

Inventor: ALIMI HOJABR

Applicant: OCULUS INNOVATIVE SCIENCES INC

2005-06-30

EP1461474

**METHOD AND APPARATUS FOR PRODUCING NEGATIVE AND POSITIVE
OXIDATIVE REDUCTIVE POTENTIAL (ORP) WATER**

Inventor: SUMITA OSAO [JP]

Applicant: OCULUS INNOVATIVE SCIENCES INC [US]

2004-09-29

Patent Applicant : Electrolyzer Corp.

WO2006127633

**ACIDIC ELECTROLYZED WATER PRODUCTION SYSTEM AND PROTECTION
MEMBRANE**

Inventor: SANO YOICHI [JP] ; TAYLOR BARRY

Applicant: ELECTROLYZER CORP [US] ; SANO YOICHI [JP] (+1)

2006-11-30

Abstract -- An improved device and method for the creation of acidic electrolyzed water is described. The device has an flow-through anode chamber and a static cathode chamber. The static cathode chamber contains a fixed amount of salt-containing electrolyte, which is renewed as needed. The flow rate of water through the anode is restricted to a range of about 5 to 40 ml per ampere of current passed through the electrode. Electrolyzed water flowing from the anode is diluted to obtain the desired concentration of hypochlorous acid, and is collected in a tank or other vessel. The electrolysis reaction is terminated when a preset amount of current has passed through the anode. Water circulation may be one pass or recycling. In a preferred embodiment, the membrane is anion-selective.; Preferably, the membrane and the electrodes are integrated into a preassembled format that can be attached to the anode and cathode compartments via flanges or similar devices allowing quick replacement of an electrode assembly in an electrolyzer. The anion-permeable membrane can be protected by a protection membrane, in which are provided slits or other discontinuities to allow venting of gas.

<http://www.ietusa.net/>

Integrated Environmental Technologies, Inc

EcaFlo® Technology

A unique technology utilizing electro-chemical activation (ECA) has been in use around the world for more than 30 years. The technology allows for the functional properties of water to be temporarily modified into solutions which can be used to destroy microorganisms, neutralize chemical agents, purify water and clean and degrease surfaces. IET's EcaFlo® Division uses this unique technology as the core of its manufacturing platform to produce ECA equipment.

IET designs, assembles, manufactures and sells the equipment that produces the two basic types of ECA solutions: anolytes and catholytes. Anolytes are strong oxidizing solutions that are used as antimicrobial agents to kill microorganisms. Catholytes are anti-oxidant, mild alkaline solutions that can be used as detergents and degreasers. Anolyte and catholyte solutions:

* Are environmentally friendly * Do not require special handling * Are hypoallergenic * Can be safely disposed of in sewage systems * Are fast acting * Are powerful biocides * Can be used throughout the disinfecting and cleaning process * Can be applied in liquid, ice or aerosol form * Yield no synthetic chemical residues * Can be generated on-site, eliminating the handling and storage of chemicals * Can be produced from tap water and a very dilute brine solution

IET produces and sells equipment under the EcaFlo® name brand. These equipment systems which can be placed on-site at point of use, generate reliable, economical and predictable liquid biocide solutions from sodium chloride (salt) brine.

EcaFlo® Technology - How It Works

The ECA process that IET employs is a patented technology that uses an electrolytic cell to temporarily alter the properties of water. The cell is exclusively manufactured for IET in the United States and is designed to meet specific IET performance requirements. The IET electrolytic cell is a specially designed and patented device consisting of a titanium anode tube, coated with

precious metals, and separated from a titanium cathode tube by a semi-porous ceramic diaphragm. This unique cell is the key component of the EcaFlo® equipment produced by IET.

When the anode and cathode tubes are electrically charged, a saline solution may be passed through the cell, producing anolyte from the anode chamber and catholyte from the cathode chamber. Anolyte and Catholyte are two distinctly different streams of activated water.

Anolyte, produced in the anode chamber of the cell, is a strong oxidizing solution with a pH range of 3.5 - 8.5 and an Oxidation-Reduction Potential (ORP) of +600 to +1200mV. The most common application of anolyte is as a biocide agent.

Catholyte, produced in the cathode chamber of the cell, is an antioxidant, mildly alkaline solution with a pH range of 10.5 - 12.0 and ORP of -600 to -900mV. The most common application of catholyte is as a mild cleaning detergent and degreasing agent.

Patent Applicant: INTEGRATED ENVIRONMENTAL TECHN.

US2008200355 // WO2008089120

**AQUEOUS SOLUTION FOR MANAGING MICROBES IN OIL AND GAS PRODUCTION AND
METHOD FOR THEIR PRODUCTION**

Inventor: EMMONS STUART

**Applicant: INTEGRATED ENVIRONMENTAL TECHN [US] ; EMMONS STUART A [US]
2008-07-24**

Abstract -- This invention relates to compositions for the management and treatment of water used for the production of oil and gas products comprising an electro-chemically activated, cation or anion-containing aqueous solution (catholyte or anolyte), and to a system and process for their production. A plant is described for treating water used for petroleum production and products including a water reservoir (15), a salt feed device (19) for creating an aqueous salt solution, an electrolysis device (21) to produce anolyte and catholyte solutions, an anolyte tank (31), a cation tank (32) and an anion holding/transport container (33) from which solution is injected into a petroleum processing, petroleum production enhancement or petroleum product application.

<http://www.eau-x.com/>

EAU Technologies, Inc.

EAU Technologies, Inc., is the leading provider of EMPOWERED WATERTM - electrolyzed oxidative (EO) and reductive (ER) water equipment for high-volume, business-to-business applications. Our breakthrough technology is revolutionizing food safety and the way businesses think about cleaning and disinfecting with highly effective green technology without toxicity.

Salmonella, E. coli, Streptococcus, Staphylococcus, and Campylobacter are but a few pathogen names that appear in our news headlines. These pathogens pose a threat to our air, water and food supplies. Empowered Water generators diminish and even eliminate many of these pathogens without the use of toxic chemicals.

EAU's industry disrupting equipment create water-based fluids which are highly effective, ecologically safe and gentle enough to be used around humans, food and animals in most current applications. We serve forward-thinking companies in industries including agriculture, dairy, meat and produce processing, grocery, liquid food and beverage processing (CIP), home maintenance and environmental remediation.

EAU Receives Mold Remediation Patent --

Patent Applicant : EAU Technologies

WO2008080119

APPARATUS AND METHODS FOR ELECTROLYZED WATER

Inventor: KINDRED DOUGLAS

**Applicant: EAU TECHNOLOGIES INC [US] ; KINDRED DOUGLAS W [US]
2008-07-03**

Abstract -- An apparatus and method for the production of alkaline water is provided, wherein the water, when administered to cattle, is effective for the treatment and prevention of rumen acidosis. Additionally, the alkaline water is effective for increased production of milk and increased quality of milk produced.

US2004265394

Method for Remediating Mold and Mildew using Acidic Electrolyzed Water

Inventor: MORRIS CHAD D [US] ; STONE JAMES

**Applicant: MORRIS CHAD D, ; STONE JAMES K, (+1)
2004-12-30**

Abstract -- Methods for remediating mold and mildew are provided using acidic electrolyzed water. Acidic electrolyzed A water, electrolyzed C water or combination of electrolyzed A and C water is released into an infected area through a high pressure sprayer, a mister or an electrostatic sprayer. Upon contacting the infected area, mold and mildew growing in the infected area is remedied.

<http://www.springerlink.com/content/qm8375581070844x/>

Development of a Device to Provide Electrolyzed Water for Home Care

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Noor Azuan Abu Osman, Fatimah Ibrahim, Wan Abu Bakar Wan Abas, Herman Shah Abdul Rahman and Hua-Nong Ting

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(2) Osaka Electro-Communication University, 1130-70, Kiyotaki, Shijonawate, Osaka, Japan

(3) Department of Biomedical Engineering, Osaka Electro-Communication University, Osaka, Japan

(4) Department of Medical Technology, Kobe Tokiwa University, Kobe, Japan

Abstract -- Strongly acidic electrolyzed water (SAEW) is readily prepared from water containing NaCl by direct current electrolysis. SAEW has a strong bactericidal activity due to the high available chlorine (AC) concentration. We developed a compact device with a titanium-coated platinum electrode to make electrolyzed water for home care and evaluated this device. Analysis of the electrolyzed water produced by the device confirmed that the water on the anode side conformed to the definition of SAEW and it had a strong bactericidal activity. This device is useful for making SAEW as a disinfectant to employ at home care, when considering economic and environmental factors, since it returns to ordinary water after use.

Contact Information Koichi Umimoto

Development of a Device to Provide Electrolyzed Water for Home Care

K. Umimoto¹, H. Kawanishi¹, K. Kobayashi¹ and J. Yanagida²

¹ Department of Biomedical Engineering, Osaka Electro-Communication University, Osaka, Japan

² Department of Medical Technology, Kobe Tokiwa University, Kobe, Japan

Abstract — Strongly acidic electrolyzed water (SAEW) is readily prepared from water containing NaCl by direct current electrolysis. SAEW has a strong bactericidal activity due to the high available chlorine (AC) concentration. We developed a compact device with a titanium-coated platinum electrode to make electrolyzed water for home care and evaluated this device. Analysis of the electrolyzed water produced by the device confirmed that the water on the anode side conformed to the definition of SAEW and it had a strong bactericidal activity. This device is useful for making SAEW as a disinfectant to employ at home care, when considering economic and environmental factors, since it returns to ordinary water after use.

Keywords — Electrolyzed water, Disinfectant, Bactericidal activity, home care

I. INTRODUCTION

When water containing NaCl is electrolyzed by a direct current in a container with a membrane partition, electrolyzed water containing high levels of O₂ and Cl₂ are formed on the anode side, and containing large amount of H₂ are formed on the cathode side. A strongly acidic electrolyzed water (SAEW) is generated on the anode side (Fig. 1). SAEW is defined that pH is less than 2.7, oxido-reduction potential (ORP) is more than 1.1V and available chlorine concentration (AC) is 20~60 ppm.

SAEW has attracted considerable interest in a medical field. Especially, it has been reported that SAEW has a strong bactericidal activity[1][2]. Recently it has become clear that its activity is mainly due to the available chlorine (AC) concentration, including HClO and Cl₂, in the SAEW. Also, some reports have shown the generation of H₂O₂ and hydroxyl radical in SAEW. On the other hands, some problems remain for using SAEW as a disinfectant. It seems to be unstable that SAEW is affected by light or organic matter. We had reported that the AC level in SAEW decreased after generation though its pH remained stable for a long period and that was markedly decreased by stirring[3][4].

In this present study, we developed a compact device to provide electrolyzed water for home care and investigated the properties of electrolyzed water produced by this device under certain conditions.

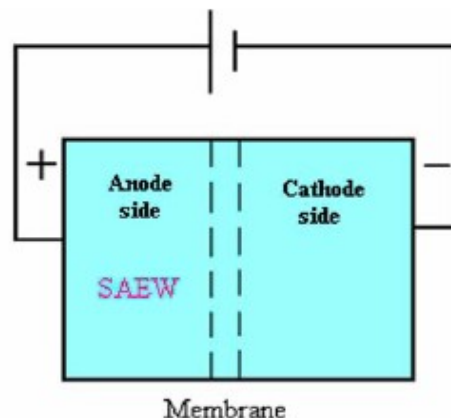
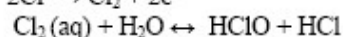
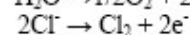
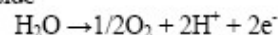
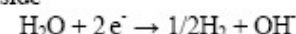


Fig. 1 Principle of electrolyzed water production

Anode side



Cathode side



II. METHODS

The device for making electrolyzed water was formed from acrylic resin and had a titanium-coated platinum electrode. The device was 12 centimeter (cm) in length, 20 cm in width, 20 cm in height, with a capacity of 4 liters (Fig. 2).



Fig. 2 Device of electrolyzed water production