

All Kangen Made Easy I

SCIENCE BEHIND KANGEN WATER

Alkaline, ionized, antioxidant, molecular hydrogen rich, powerful
living water



By Anick MARTINEZ

WELCOME!

Welcome to your Science Behind Kangen Water e-book!

I created this e-book with the purpose of helping Enagic Distributors understand their product and mitigate some of the myths behind Kangen Water. During my research I came across a lot of misinformation, some that I am guilty of spreading in the past...

I took the time to carefully read tons of scientific papers to be able to provide you the best information.



In this e-book we will dive deep into the science behind **Kangen Water, aka ERW**, from the filtration process to the electrolysis, the science behind Mild, Strong Acidic and Strong Alkaline Water, and more!

It is crucial to understand the electrical and chemical mechanisms of the electrolysis process in order to fully understand the benefits of this powerful water.



Take your time while reading this e-book, some concepts may be new to you.
Enjoy your reading!

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VOCABULARY

Kangen Water is the commercial name for Electrolyzed Reduced Water (ERW). ERW is also termed alkaline electrolyzed water, alkali-ionic water, alkaline cathodic water, and alkaline ionized water.

Acid/Base reaction: chemical reaction that occurs between an acid and a base. It can be used to determine pH. *(not relevant here, but just for your information).*

Antioxidants: a substance that inhibits oxidation.

Dissociation: general process in which molecules (or ionic compounds such as salts, or complexes) separate or split into smaller particles such as atoms, ions, or radicals, usually in a reversible manner.

Electrode: a conductor through which electricity enters or leaves an object, substance, or region.

Enzyme: a substance produced by a living organism which acts as a catalyst to bring about a specific biochemical reaction.

Free radical: atoms or molecules that contain one or more unpaired electrons. They cause oxidative damage thus causing ageing and disease.

Ion: an atom with a net electric charge due to the loss or gain of one or more electrons.

Micelle: an aggregate of molecules in a colloidal solution, such as those formed by detergents.

Organelle: specialized structures within a living cell (mitochondria, nuclei etc).

Oxidation: loss of electron(s). Oxidation is a chemical reaction that can produce free radicals, thereby leading to chain reactions that may damage the cells of organisms.

Redox reaction: type of chemical reaction that involves a transfer of electrons between two species.

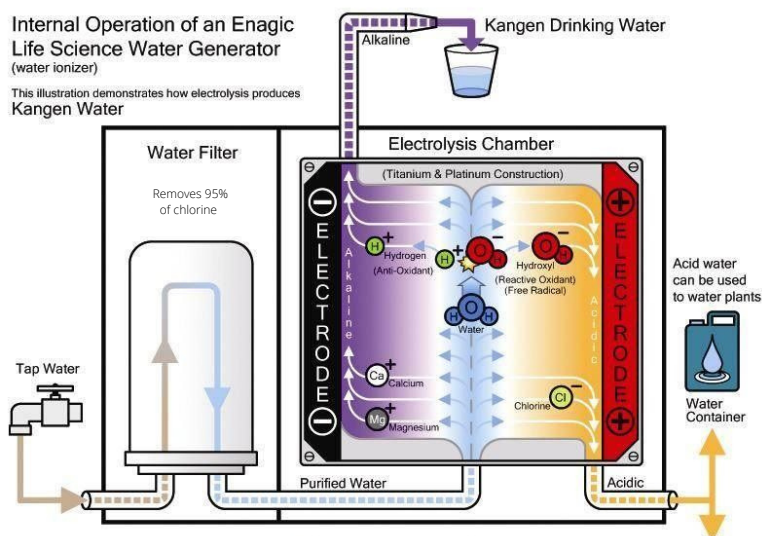
Reduction: gain of electron(s). Chemical reaction that neutralizes free radicals.

Saponification: hydration reaction where free hydroxide (OH⁻) breaks the ester bonds between the fatty acids and glycerol of a triglyceride, resulting in free fatty acids and glycerol. In other words, breaking fat and oil based substances. *(not relevant here, but just for your information).*

Skin microbiome: the billions of microbes living on your skin are called your skin microbiome. These microorganisms (also called skin flora) are harmless or even beneficial, playing a vital role in your immune system and skin appearance.

K8 FILTRATION

Enagic filters are Granulated Antibacterial Activated Charcoal, Calcium Sulfite and Mechanical Filters, their main purpose is to **remove chlorine by up to 95%**.



Fluoride is not removed by this filter, it is one of the hardest chemicals to remove. To remove Fluoride you need **Enagic pre-filters** that remove it up to 90% - **GREY filter** from the DPS.

Removing ALL the fluoride from the water implies removing ALL the good minerals too, and in order for the electrolysis process to happen, minerals are needed.

These integrated water filters **DO NOT** remove fluoride, bacteria, chloramines, iron, nitrates, heavy metals or arsenic, which is why pre-filters are a huge plus (if not a must!).

PRE-FILTERS

In order to create the highest quality ionized water it is extremely important to start with the cleanest source water available. While Kangen Water ionizers do a great job creating highly antioxidant water, **they are not intended as filtration systems**, and they are unable to remove all pollutants from your water supply.

BENEFITS OF HAVING PRE-FILTERS

Improves the quality of your ionized water and increases the antioxidant content

Many of the pollutants found in tap water today will slow down the flow of electricity through water, preventing many of the water molecules from proper ionization.

This includes chemical byproducts from the breakdown of plastics, petrochemicals and many pharmaceutical drugs as well as excess calcium found in hard water. These substances are known as insulators, and by their nature, insulators slow or completely impede the flow of electricity.

Improper conduction of electricity through the water decreases the number of water molecules that are split into OH⁻ (hydroxide molecules) and H⁺ (active hydrogen).

The more water molecules that split apart, with a cleaner water source, the greater the number of antioxidants are produced. The greater the quantity of antioxidants contained in the water, the better the health results!

Extends the life of your machine and its main filters

Pre-filtering your tap water can double the life of your unit's filtration system. Pre-filtering your tap water (both municipal and well water) removes many of the naturally occurring minerals that are actually harmful to the ionizing plates in your unit. It helps protect your ionizer machine from minerals that coat the plates and render them ineffective, and also protects against substances that damage the platinum, which can create pitting and dramatically decrease the useful life of the plates.

ULTRA-E FILTRATION SYSTEM

The Ultra-E Submicron Depth Filtration Series is manufactured using a proprietary, patented, electro-absorptive media technology, and is capable of **removing submicron pathogens and inorganic contaminants through electro-adhesion and ion exchange.**



This technology makes it possible for a nonwoven media to produce filtration efficiency comparable to ultramembrane filtration but at very low pressure drop, with high flow rates and high loading capacity working equally well in fresh, brackish or salt waters.

The media in the Ultra-E filter is NSF 61-approved.

Filter will pass up to 1500 gallons of water - Comes with Filter and Housing

The ULTRA-E filter reduces, or removes the following pathogens:

>99.99% of viruses (polio, rotavirus, norovirus, etc.)**

>99.99% of bacteria (e coli, legionella, pseudomonas, etc.)**

>99.95% of cysts (giardia, cryptosporidium, etc.)**

** Tested by a certified laboratory in the U.S. (testing was done at 6.5pH)

The Ultra-E filter removes or reduces the following heavy metals:

>95% Lead **

>90% Ferrous Iron **

>95% Arsenic V **

>95% Cadmium **

>85% Chromium **

>75% Selenium **

>60% Mercury

** Tested by a certified laboratory in the U.S. (testing was done at 6.5pH)

The ULTRA-E filter removes, or reduces the following organic and inorganic chemicals:

VOCs (volatile organic compounds)

PCBs and BPA

Residual pharmaceuticals

Bio-fouling precursors: organic acids, proteins, polysaccharides

DUAL PRE-FILTRATION SYSTEM



ORANGE FILTER- Acid Neutralizer

This filter neutralizes acidic or low pH water (well water). Filter life span depends on the source water acidity.

PURPLE FILTER- Lead & Sediment

Note: need adequate water pressure or may not flow water properly.

This is a triple sediment, taste and odor controlling, lead removal filter, which removes dirt from your water while controlling lime and scale deposits on your equipment.

BLUE FILTER- Grit & Dirt

This 5 micron sediment filter removes grit and dirt from the water while controlling lime and scale deposits. Particulate reduction average of 98.8%

GREEN FILTER - Ion Exchange Filter - Softener

This Ion Exchange filter softens water by removing up to 677 grains of hardness from the source water. Reducing the dissolved calcium and magnesium, some manganese and ferrous iron. This filter is best used when making strong Kangen/strong Acidic water. You should replace filter with Blue or Purple filter when making Kangen drinking water to extend the life of the Green filter.

BLACK FILTER - Chloramine

Note: this is a 1 micron filter and will need adequate water pressure to flow water properly.

Carbon Chloramine Reduction Filter reduces chloramines by up to 99%! It also removes bad taste and odors caused by chloramines and possible skin irritation. Filter lifespan: 6 months/1,500 gallons.

GRAY FILTER- Fluoride Reduction

This filter reduces fluoride (90%), arsenic and selenium which are sometimes found in drinking waters. This filter's lifespan is 500 gallons.

Depending on what you want to remove from your water. Check your local water type to make an informed decision.

ELECTROLYSIS

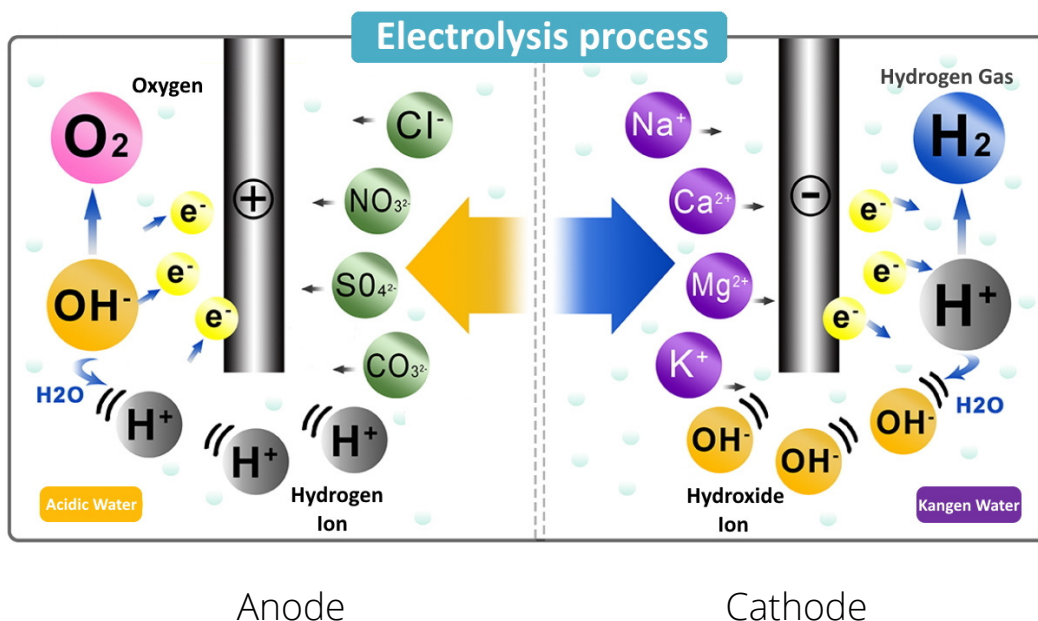
For water to be electrolyzed there **MUST** be a mineral in the source water.

WHAT IS ELECTROLYSIS?

- Electrolysis is a process by which **electric current is passed through a liquid or solution to effect a chemical change.**
- The chemical change is one in which the substance loses (oxidation) or gains an electron (reduction).

HOW DOES ELECTROLYSIS WORK?

- The process is carried out in an electrolytic cell, an apparatus consisting of positive and negative electrodes held apart and dipped into a solution (electrolyte) containing positively and negatively charged ions. Enagic water ionizers have platinum-dipped titanium plates.
- In this process, **positive ions (cations) come to the negative electrode (cathode) and negative ions (anions) come to the positive electrode (anode).**



CHARACTERISTICS OF ERW

- The production of ERW begins by a dissociation* of H₂O molecules to produce H⁺ and OH⁻ ions.
- **At the cathode, H⁺ ions gain electrons** to change into active atomic hydrogen (H). Active atomic hydrogen exhibits high reducing potential, so it is then changed into hydrogen molecules (H₂).
- **At the anode, OH⁻ ions loose** electrons to form OH, which results in the production of O₂.
- **Cathodic alkaline water (reduced water) is abundant in Molecular Hydrogen, whereas anodic acidic water (oxidized water) is abundant in Dissolved Oxygen.**

HYDROXYL VS HYDROXIDE ION

Big difference between **Hydroxide ion (OH⁻)** and **Hydroxyl radical (OH·)**



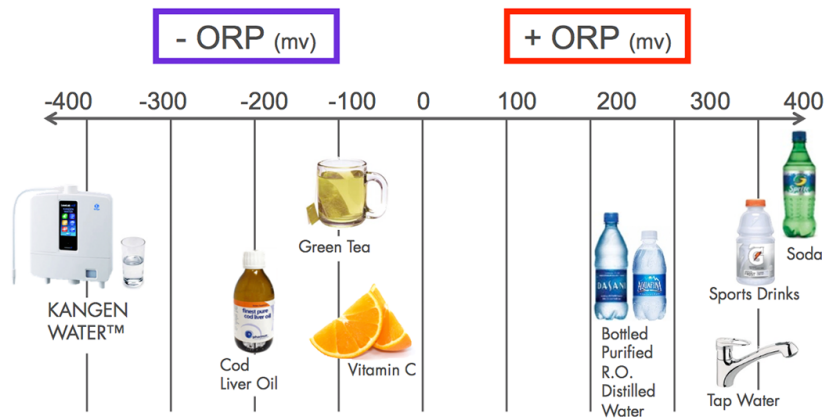
- The black dot on the symbol OH· is indicative of an unpaired electron, which means it is a free radical*. **The Hydroxyl radical has the highest oxidizing capacity among all chemical components on earth.**
- **The Hydroxide ion** contains a stable pair of electrons, it **is a base**, with a neutral property. Hydroxides are reactive when discussing Acid/Base* chemistry.
- **Hydroxide (HO⁻) is higher in alkaline water** according to the definition of pH, but it is **not a biological antioxidant***.
- The therapeutic agent in ionized water is **Molecular Hydrogen**.

MOLECULAR HYDROGEN AND ACTIVE HYDROGEN

- According to Dr. Hayashi, when Hydrogen Rich Water, (water rich in dissolved molecular hydrogen), enters your body, the **Molecular Hydrogen (H₂) is broken down into Atomic Active Hydrogen (H) in the body. Molecular Hydrogen is broken into Active/Atomic Hydrogen by Hydrogenases (enzymes*)** in the body. *Read more about Dr. Hayashi's research [here](#).* Other studies say that H₂ is broken down into H because of the **action of Platinum Nanoparticles as a catalyzer** ([Shirahata, et al. 2011](#)). The exact mechanisms of the action of H₂ are still unknown, further research is needed.
- As a very small molecule, **Molecular Hydrogen can rapidly diffuse and penetrate into tissues and cell membranes** and even reach organelles*.
- "Recent publications revealed that, in addition to the **direct neutralization of highly reactive oxidants**, H₂ indirectly reduces oxidative stress by regulating the expression of various genes. Moreover, by regulating gene expression, **H₂ functions as an anti-inflammatory, antiallergic, and antiapoptotic molecule, and stimulates energy metabolism.**" ([Shigeo Ohta, et al., 2015](#))

OXIDATION REDUCTION POTENTIAL

- One of the main characteristics of water high in dissolved molecular hydrogen is that it exhibits a **negative Oxidation-Reduction Potential (ORP)**.
- The ORP measures the capacity of a solution to either release (-) or accept (+) electron from chemical reactions. In other words, **the ORP measures the capacity of a solution to be an antioxidant or an oxidant.**
- **The negative ORP of fresh Kangen Water from a K8 is -850.** Molecular Hydrogen diffuses rather quickly which is why it is recommended to always drink fresh Kangen.



ACTIVE OXYGEN SPECIES

“Active oxygen species or free radicals are considered to cause extensive oxidative damage to biological macromolecules, which brings about a variety of diseases as well as aging.

The ideal scavenger for active oxygen should be ‘active hydrogen’. ‘Active hydrogen’ can be produced in reduced water near the cathode during electrolysis of water.

Reduced water exhibits high pH, low dissolved oxygen (DO), extremely high dissolved molecular hydrogen (DH), and extremely negative redox potential (RP) values.” (Shirahata S, et al., 1997)

- **Active oxygen species, Reactive Oxygen Species (ROS) or free radicals**, such as singlet oxygen, superoxide anion radical, hydrogen peroxide and hydroxyl radical are considered to cause extensive oxidative damage to biological macromolecules (**DNA**, membrane polyunsaturated fatty acid chains, enzymes and so on), **which bring about a variety of diseases, as well as aging.**
- **Molecular Hydrogen has proven to be effective in neutralizing Hydroxyl Radicals (HO·) and Peroxynitrates (ONOO-) only**, it is also possible that H₂ is acting as a catalyst/helper in our body's natural antioxidant system or as an actual antioxidant.
- **Oxidation is part of our daily life which is why it's important to consume high quality, antioxidant food and water.**

- **"The exact molecular mechanisms of the effects of low-dose H2 remain unclear (...)** H2 is a specific scavenger of **·OH and ONOO-**, which are very strong oxidants that react indiscriminately with nucleic acids, lipids, and proteins, resulting in DNA fragmentation, lipid peroxidation, and protein inactivation. Fortunately, H2 does not appear to react with other ROS that have normal physiological functions in vivo". (*Li Ge, et al., 2017*)
- "H2 selectively reduced the hydroxyl radical, the most cytotoxic of reactive oxygen species (ROS), and effectively protected cells; however, H2 did not react with other ROS, which possess physiological roles." (*Ikuroh Ohsawa, et al., 2007*)

MICRO-CLUSTERING

- **"Micro-clustering" is a claim** made by water enthusiasts. The claim is that by altering water through electrolysis, water can be re-structured into smaller water clusters thus improving cellular hydration.
- Unfortunately there is more scientific evidence to refute this claim than to support it, although this is a growing field of study. Read more about the science behind the claims [here](#).
- Dr. Masaru Emoto has conducted some of the world's most revolutionary studies on water and the structure of water, read about them [here](#).
- Because there is no clear answer on this subject yet, it is highly advised not to mention it.

IONIZED VS ARTIFICIAL ALKALINE WATER

- **Artificially altered alkaline water has added minerals** (such as sodium bicarbonate, magnesium, calcium, etc.) to create a change in the pH. This can cause **minerals to build up in the system. Other compounds found are also very detrimental to our health (ex: potassium chloride).**
- **Electrically altered water has no added chemicals.** The change in the pH is just a byproduct of the electrolysis process.

ALKALINE MINERALS IN KANGEN

- The electrical charge **re-arranges healthy minerals** that are naturally present in your tap water. *Although this also depends on the quality of your source water.*
- As a result, Kangen water contains positively charged essential minerals, such as **Calcium, Magnesium, Sodium and Potassium, in an ionic form** that can easily be assimilated immediately into your body. These are called **electrolytes**.
- Our bodies use these minerals to regulate muscle contraction, neuronal communication, bone regeneration, and more! When you don't provide your body with enough of these minerals, it will deplete your inner mineral storage to help regulate bodily functions.

DURATION OF KANGEN WATER PROPERTIES

- **Antioxidant property:** 12-54 hrs
- **Alkaline property:** 1-2 weeks

This also depends on **how and where you store** your Kangen Water.

For maximum benefits from the dissolved molecular hydrogen, drink Kangen Water **30-60 minutes after its production**.

Enagic recommends to drink Kangen Water within 3 to 4 days after its production.

CONCLUSION ON DRINKING WATER

- Kangen Water a.k.a Electrolyzed Reduced Water (ERW), has an alkaline property due to the OH⁻ (and alkaline minerals) but it does not count as a biological antioxidant.
- **The highly antioxidant properties of the water come mainly from the powerful Molecular Hydrogen.** This molecule is capable of scavenging two very strong oxidants and is also believed to be a catalyst in some naturally occurring antioxidant reactions in our body. The effects are clear but further research is needed to elucidate the mechanisms behind these reactions.
- Reactive oxygen species are the cause of oxidation in the body. Oxidation leads to a deterioration and/or death of healthy cells. **Molecular Hydrogen may be the ideal scavenger of these reactive species.**
- **Micro-clustering is a claim** that has not yet been validated by the scientific community.
- Artificially altered alkaline water has added minerals, some that are harmful. **Electrically altered water has no added chemicals.** The change in the pH is just a bypass of the electrolysis process.
- The electrical charge re-arranges healthy minerals, as a result, **the water contains essential minerals in an ionic form** that can easily be assimilated immediately into your body.
- Drink Kangen Water 30-60 minutes after its production to get maximum benefits.

ACIDIC WATER

MILD ACIDIC WATER

- Acidic water is produced at the positive electrode (anode).
- The Japanese Ministry of Health, Labor, and Welfare (JMHLW) approved this water in 1965, as an **astringent for beauty purposes**.
- The pH of Mild Acidic Water (4-6) is similar the pH of the skin (pH around 5.5), thus helping maintain a **healthy pH for the skin flora** (skin microbiome*).
- **Maintaining a healthy skin pH and skin flora is key to have a healthy skin.**

STRONG ACIDIC WATER

- Strong acidic water, known as **electrolyzed oxidizing water (EOW)** is **produced via electrolysis of a NaCl (salt) solution** at the anode side. **The resultant product is a solution of hypochlorous acid (HOCl)** with a pH less than 2.7 and a positive ORP +1000 mV to +1600 mV.
- This anodic water contains oxidative characteristics due to a variety of chemical species (HOCl, O₂⁻, 1O₂, etc.). The high oxidation-reduction potential (ORP) of EOW is an indicator of its **bactericidal effects**. Hypochlorous acid is the primary agent in this water, but the other free radical species are also important to its powerful germicidal activity.
- EOW is used for **sterilization, disinfection, and sanitization**.
- EOW is effective in **killing pathogens, bacteria, viruses, spores and other microorganisms**.
- This water has also been proven to be effective to **remove pesticides**.
- EOW doesn't appear to exert the same irritation as HOCl to **skin and other mucous membranes**.

[Strong Acidic Water](#) | [Molecular Hydrogen Institute](#).

STRONG ALKALINE WATER

- Electrolyzed alkaline water is **produced via electrolysis of a NaCl** solution at the cathode side. **The resultant product is a solution of sodium hydroxide (NaOH)** with a pH of 11-13.8 and a negative ORP of -750 to -900 mV due to the dissolved hydrogen gas.
- This cathodic water is considered a **functional water** because it is used for **cleanses, rinsing, disinfecting, lipid extraction**, etc. It can readily saponify* oils, making it a useful washing agent for greasy or oily areas.
- This also gives it the ability to **reduce the pesticides on produce** by soaking the vegetables in this water for 10-20 minutes.
- **The ability of this water to saponify fats increases when stored for a day.** *A possible explanation for this is that as the water sits calcium salts (e.g. carbonates) form and drop out of the solution. This is important because calcium blocks micelle* formation, which is important for final saponification/emulsification of the oil.*

[Strong Alkaline Water | Molecular Hydrogen Institute](#)

WHAT ENAGIC SAYS ABOUT STORING MILD, STRONG ACIDIC AND STRONG ALKALINE WATER

- **Keep Strong Acidic and Strong Alkaline Water in the refrigerator for no more than 4-5 days** and replace the water in your take-out bottle everyday.
- For water used for **domestic purposes, including Acidic Water, Strong Acidic Water and Strong Kangen Water, less care is required, but we recommend changing your supply once a week.**
- To store, please **place the water in a lightproof container**, fill it to the very top to avoid unnecessary contact with air, and store it in a cool, dark place (**the refrigerator is ideal**).

EFFECT OF TEMPERATURE

	pH Before	ORP Before	pH After	ORP After	Temp
Microwave	10.7	-764	10.4	-755	108
Boil	10.7	-735	9.9	103	212
Fridge	10.6	-755	10.5	-385	45
Freeze	10.4	-755	10	-460	32
Cup of ice water	11	-785	11	-770	32

- **Boiling ionized water does significantly decrease its health value.** It will take the negative ORP (anti-oxidant value) out of the water and will even reduce the pH somewhat.
- **Freezing ionized water does not,** by itself, reduce its health value very much. As long as you take precautions to not expose the ionized water to air, your frozen ionized water should be good.
- **Warming your ionized water does not seem to reduce the health value much** (unless you bring it to a high temperature).
- **Adding ice** (especially if the ice was made of ionized water) **doesn't decrease its health value.**

Click [here](#) to watch the experiment

ENAGIC CERTIFICATIONS

Enagic International is certified to; ISO 9001, ISO 14001, and ISO 13485 for quality control and environmental management, the Water Quality Association Gold Seal for product certification, and a member in good standing of the prestigious Direct Selling Association.



Our **ISO 9001** certification means that our quality management system has been audited and reviewed by an official registrar to ensure that our systems are focused on meeting customer's expectations through certified procedures and a continual improvement process. We never waiver in our commitment to provide products that contribute to improved health and to the global environment, coupled with best-in-class quality and customer service.



ISO 14001 is the world's most recognized environmental standard. Our certification to this standard ensures that we've mapped out a framework for environmental management with the best practices to help minimize our environmental footprint. Specifically, we work to secure materials with a low environmental load, to reduce, reuse and recycle waste, and to conserve natural resources and achieve energy-efficiency in order to prevent global warming. Our team observes all laws, regulations and standards with regard to the environment and safety. Our employees are thoroughly trained to

raise their awareness of environmental and safety issues for the prevention of environmental and work-related accidents. All practices and procedures have been certified by an official registrar.



ISO 13485 signifies that our quality management system demonstrates its ability to provide medical devices and related services that consistently meet consumer and regulatory requirements applicable to medical devices and related services.



WQA Gold Seal Certificate Enagic USA

The Water Quality Association (WQA) is a not-for-profit international trade association representing the residential, commercial and industrial water treatment industry. WQA maintains a close dialogue with other organizations representing different aspects of the water industry in order to best serve consumers, government officials, and industry members. [Click to View](#)

WQA Official Gold Seal Listing

program is dedicated to providing public health and safety services throughout the USA and globally, while maintaining expert service, superior reputation, and fair pricing. Product Certification ensures that our product is constructed from safe materials, the claims listed on the packaging are backed by test data, and our product will hold up under normal usage conditions. [Click to View](#)



DSA Code of Ethics
Communication Initiative
Certificate of Recognition
Presented to: Enagic USA Inc.



Registration for Kangen Ukon
Certificate of FDA Food Facility.
Registration Number:
15226513166



Medical Device Manufacturing
license
Issued by Osaka Prefecture. License
Number: 27BZ006010



Medical Device Marketing
Authorization
Issued by Ministry of Health, Labour
and Welfare, Government of Japan.
License Number: 27R2X00070



Registration certificate of Kangen
Water®
Issued by United States Patent and
Trademark Office. Registration
Number: 4,063,154



Registration certificate
Change Your Water - Change Your
Life Issued by United States Patent
and Trademark Office. Registration
Number: 3,852,774



Certificate of Registration of
Copyright
The information on this certificate
has been made a part of the
Copyright Office records.



8-Point Business Model Trademark
Exclusive trademark status



100 Direct Selling News Global
2011
Issued for Enagic USA, Inc, #60



Water Safety

Enagic USA is committed to the highest safety standards in all aspects of manufacturing, distribution and servicing. As such, we are sensitive to the worry over possible contamination as a result of the 2011 Japan earthquake.

Please rest assured ALL Enagic products are completely free of radiation and are completely safe for use.

*To get a product approved as medical grade in Japan is arguably the most difficult in the world!
Because of the strictest quality control levels.*



Inspection Report of Non-radioactive
Surface Contamination

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