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ENAGIC KANGEN WATER® • LEVELUK K8 & SUPER 501

Hydrogen Water *Product & Science* Reference Guide

The machines, the filtration, and the peer-reviewed science behind molecular-hydrogen-enriched water — written for the curious, with the citations to back it up.

THE
IONIZERS

PRE-
FILTRATION

THE
SCIENCE

GERM
DEFENSE

REFERENCES

01 The two ionizer systems

Enagic International — founded in Okinawa, Japan in 1974 — manufactures the Leveluk line of water ionizers. Production is certified to ISO 9001, ISO 14001, and the medical-device standard ISO 13485. Each machine turns ordinary tap water into five functionally distinct water types through electrolysis.

FLAGSHIP · HOME & SMALL BUSINESS

Leveluk K8 — the 8-plate antioxidant ionizer

The K8 is Enagic's most powerful home ionizer. Eight platinum-coated titanium plates give it a larger electrode surface, driving a stronger hydrogen-evolution reaction, a more negative ORP (−722 mV), and a more stable pH range across flow rates. A worldwide multi-voltage supply and 10-language voice guidance make it travel-ready.

Electrode plates	8 platinum-coated titanium (135 × 75 mm each)
ORP (negative)	−722 mV
pH range	2.5 – 11.5 · 5 water types
Production rate	Kangen® 4.5–7.6 L/min · Acid 1.5–2.6 · Strong acid 0.6–1.1
Power / weight / size	230 W · 5 kg · 279 × 345 × 147 mm
Languages / warranty	10 (display + audio) · 5-year warranty

INDUSTRIAL · DUAL-CELL

Leveluk Super 501 — production-grade power

The Super 501 uses a dual electrolytic cell (a 7-plate and a 5-plate array working at once) to produce strong acidic and strong alkaline water simultaneously through separate output hoses. It reaches −800 mV — the most negative ORP of any Enagic model — and sustains roughly 2 gallons/min of Kangen® water for about 30 minutes continuous. This is the system used in the antimicrobial testing later in this guide.

Electrode config	Dual cell: 7-plate + 5-plate, platinum-coated titanium
ORP (negative)	−800 mV (highest of all Enagic models)
Max output	≈2 gal/min for ≈30 min continuous
Power / weight / size	200 W · 10.1 kg · 352 × 384 × 250 mm
Special features	Dual-hose output · electrolysis-enhancer tank · auto-cleaning

02 Clean water in, clean water out

A water ionizer is only as good as the water entering it. Municipal tap water routinely carries chlorine and chloramines, sediment, heavy metals (including lead and arsenic), volatile organic compounds, and emerging contaminants such as PFAS — the so-called "forever chemicals." These foul the electrode plates and pass straight into your glass unless they are removed first.

The Multipure Aquaperform (MP880)

A solid carbon-block pre-filter widely matched to Enagic systems. Unlike loose granular carbon, a solid block prevents channeling, so every drop gets uniform contact time and sub-micron filtration. It protects the electrode plates and raises the purity of the water that becomes hydrogen-rich.

What it removes	Why it matters
Chlorine & chloramines	Protect platinum electrode coatings; avoid chlorinated by-products
Lead & Arsenic V	Can concentrate on the alkaline side during electrolysis (NSF 53)
PFAS / "forever chemicals"	Not removed by electrolysis — would pass into drinking water (NSF 401)
Sediment & sub-micron particles	Solid-block retention catches what coarse pre-filters miss

NSF certified — independently, annually

NSF certifications are awarded only after independent lab testing, with annual audits and re-testing — not manufacturer self-claims. The Aquaperform carries three: **NSF 42** (aesthetic — chlorine, taste, particulates), **NSF 53** (health effects — lead, VOCs, cysts, Arsenic V), and **NSF 401** (15 emerging contaminants including PFOA/PFOS) — a class held by very few residential point-of-use filters.

Model / element	MP880 · CB11As replacement
Capacity / flow	600 gallons · 1.0 gpm (matched to Enagic inlet)
Housing	304 stainless steel · silicone seals (no BPA / leaching)
Certifications	NSF 42 · NSF 53 · NSF 401 · lifetime housing warranty

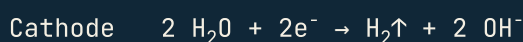
03 The science, in plain answers

Does alkaline water change my body's pH?

No — and it shouldn't. Your blood is held in a tight 7.35–7.45 window by powerful buffering systems; the stomach neutralizes ingested alkalinity and the kidneys excrete any excess. A real shift in blood pH is a medical emergency, not a wellness goal. That's why the scientific interest isn't in alkalinity at all — it's in the *dissolved molecular hydrogen (H₂)* the water carries.

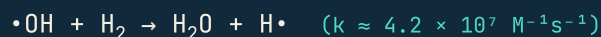
How does the machine actually make hydrogen?

Through electrolysis — an electric current splits water at platinum-coated titanium plates. Hydrogen gas forms at the cathode and stays dissolved in the drinking water, typically 0.1–1.6 mg/L (ppm).



What is molecular hydrogen, and why is it interesting?

H₂ is the lightest molecule in existence (2.016 g/mol). It is small and neutral enough to slip across cell membranes, the blood-brain barrier, and into the mitochondria. Research — beginning with a landmark 2007 *Nature Medicine* paper — suggests it acts as a *selective* antioxidant, reacting with the most cytotoxic radicals while sparing the "good" ones the body uses for signalling.



Does the hydrogen stay in the water?

No. Dissolved H₂ obeys Henry's Law and continuously escapes from an open glass. Freshly generated water holds the most — which is why ionized water is best consumed promptly, and why commercial bottled "hydrogen waters" vary so widely.

04 What the research is examining

As of 2024, over 2,000 peer-reviewed papers have studied H₂ biology. Human trials remain relatively small, but have examined measurable endpoints across several areas:

Oxidative stress	Reductions in urinary 8-OHdG (DNA oxidation) and serum MDA
Exercise & recovery	Lower lactate; reduced muscle-microtrauma markers (CK, IL-6)
Inflammation	Decreased TNF-α, IL-1β, CRP in metabolic-syndrome patients
Metabolic support	Modest improvements in lipid profiles and insulin sensitivity (pilot)
Mitochondria	Increased ATP synthesis in ex-vivo / animal models
Neuroprotection	Reduced infarct volume in ischemia-reperfusion animal models

The field is still developing; study populations are often small and follow-up short. Hydrogen water is not an approved medical treatment.

What does ORP mean?

Oxidation-Reduction Potential (mV) measures a solution's tendency to donate electrons. Hydrogen-rich water shows *negative* ORP (commonly -200 to -600 mV; Enagic systems reach -800 mV). Researchers note that dissolved H₂ concentration — not ORP alone — is the more precise, reproducible measure of hydrogen-water quality.

$$E = E^{\circ} - (RT/nF) \times \ln([H_2]/[H^+]^2) \quad \text{Nernst equation}$$

Why platinum-coated titanium plates?

Titanium is corrosion-resistant and biocompatible but a poor catalyst on its own. A platinum coating — the most efficient catalyst for the hydrogen-evolution reaction — minimizes the energy needed to split water, raising H₂ yield per unit of electricity.

05 The other tap: germ defense at 2.5 pH

The same machine that makes hydrogen-rich drinking water also produces a potent disinfectant from the acidic side — Strong Acidic Water at ~2.5 pH, whose active agent is hypochlorous acid (HOCl). Remarkably, HOCl is the same molecule your own immune cells make to kill pathogens.

$\text{Cl}_2 + \text{H}_2\text{O} \rightleftharpoons \text{HOCl} + \text{H}^+ + \text{Cl}^-$ at the anode, pH 2.5 → ~100% HOCl form

>99.999%

germ reduction (≥5-log) —
independently verified by ATS
Labs

30s

exposure time, at room
temperature, under a 5%
organic soil load

5

pathogens tested — incl. two
antibiotic-resistant "superbugs"

ATS Labs independent efficacy testing

Third-party germicidal testing of Enagic Super 501 Strong Acidic Water followed U.S. EPA sanitizer protocols, with results consistent across two machine lots (Projects A09385 & A11304).

Pathogen (ATCC strain)	Reduction	Time
Staphylococcus aureus (6538)	>99.999% (≥5-log)	30 s
Escherichia coli (11229)	>99.999% (≥5-log)	30 s
Salmonella typhi (6539)	>99.999% (≥5-log)	30 s
MRSA — methicillin-resistant S. aureus (33592)	>99.999% (≥5-log)	30 s
CRKP — carbapenem-resistant Klebsiella (BAA-1705)	>99.999% (≥5-log)	30 s

Why superbugs can't resist it

HOCl kills by oxidation — attacking many cellular targets at once — so the antibiotic-resistance genes that defeat conventional drugs are simply irrelevant to it. MRSA and CRKP (a WHO Priority-1 critical threat) were both reduced >99.999% in 30 seconds. *Strong Acidic Water is for external use — surface sanitation and irrigation — not for drinking, and degrades over time, so it is used fresh.*

06 A deeper layer: electrolyzed-reduced water research

Beyond drinking and disinfection, a body of peer-reviewed laboratory research (much of it from Kyushu University in Japan) has studied electrolyzed-reduced water (ERW) — the same cathode-side water Enagic ionizers produce — at the cellular level.

Important: these are cell-culture (in vitro) and animal (in vivo) studies. They are not clinical evidence of benefit in humans and must not be read as disease-treatment claims. ERW and Kangen® water are not approved medical treatments.

STUDY 1 • SHIRAHATA ET AL., 2002

Telomere behavior in cancer cell lines

In cultured lung (A549) and uterine (HeLa) cancer cells, ERW was associated with progressive telomere shortening, while normal fibroblast cells were not similarly affected — a selectivity the authors attributed to ERW's redox-modulating activity.

STUDY 2 • KOMATSU ET AL., 2001

Suppression of cancer-cell growth & microorganisms

ERW suppressed growth across several cancer cell lines — most markedly in soft-agar (anchorage-independent) assays — while normal cells operating at lower baseline ROS were not equivalently affected.

STUDY 3 • SHIRAHATA ET AL.

Invasion & angiogenesis

ERW reduced the invasive capacity of cancer cells and inhibited angiogenic (blood-vessel-forming) signalling in vitro — extending its studied activity to two clinically important drivers of metastasis.

STUDY 4 • SHIRAHATA, HAMASAKI & TERUYA, 2012 (REVIEW)

A unifying mechanism

This Elsevier review identifies three active agents in reduced water — dissolved H₂, active hydrogen species, and mineral (platinum) nanoparticles — that together scavenge reactive oxygen species, and frames the convergent picture across the studies above.

07 Selected literature

Peer-reviewed publications and institutional sources underpinning this guide. Readers are encouraged to consult the primary sources directly.

- 1 Ohsawa I, et al. Hydrogen acts as a therapeutic antioxidant by selectively reducing cytotoxic oxygen radicals. *Nature Medicine*. 2007;13(6):688–694.
- 2 Ohta S. Molecular hydrogen as a novel antioxidant. *Methods in Enzymology*. 2015;555:289–317.
- 3 Ishibashi T, et al. High-concentration H₂ water reduces oxidative stress & disease activity in rheumatoid arthritis. *Medical Gas Research*. 2012;2:27.
- 4 Kajiyama S, et al. Hydrogen-rich water improves lipid and glucose metabolism in type-2 diabetes / IGT. *Nutrition Research*. 2008;28(3):137–143.
- 5 Yoritaka A, et al. Pilot study of H₂ therapy in Parkinson's disease (RCT). *Movement Disorders*. 2013;28(6):836–839.
- 6 Ichihara M, et al. Beneficial effects & mechanisms of molecular hydrogen — review of 321 articles. *Medical Gas Research*. 2015;5:12.
- 7 Aoki K, et al. Hydrogen-rich water and muscle fatigue in elite athletes. *Medical Gas Research*. 2012;2(1):12.
- 8 Nakao A, et al. Effectiveness of H₂ on antioxidant status in potential metabolic syndrome. *J Clin Biochem Nutr*. 2010;46(2):140–149.
- 9 LeBaron TW, et al. Molecular hydrogen significantly reduces the effects of oxidative stress. *Molecules*. 2019;24(11):2076.
- 10 Sim M, et al. Hydrogen-rich water reduces inflammatory responses (RCT). *Scientific Reports*. 2020;10(1):12130.
- 11 Iketani M, Ohsawa I. Molecular hydrogen as a neuroprotectant. *CNS & Neurological Disorders – Drug Targets*. 2017;16(9):1062–1075.
- 12 Shirahata S, Hamasaki T, Teruya K. Advanced research on the health benefit of reduced water. *Trends in Food Science & Technology*. 2012;23(2):124–131.
- 13 Shirahata S, et al. Telomere shortening in cancer cells by electrolyzed-reduced water. *Animal Cell Technology* (Springer). 2002:355–359.
- 14 Komatsu T, et al. Suppressive effect of electrolyzed-reduced water on the growth of cancer cells and microorganisms. *Animal Cell Technology* (Springer). 2001:220–223.
- 15 ATS Labs. Germicidal & detergent sanitizing action of disinfectants — Projects A09385 & A11304.

Disclaimer. This guide is educational material summarizing published mechanisms, manufacturer specifications, and third-party test results. It is not medical advice, a diagnosis, or a treatment claim, and has not been evaluated by the FDA. Molecular hydrogen, ionized water, and Strong Acidic Water are not represented as cures for any condition. Strong Acidic Water (2.5 pH) is for external use only. Always consult a qualified healthcare professional before changing your health regimen.