Transformation in structured water

Introduction

The purpose of this report is to deliver a detailed description of MEA Water Conditioning Devices (www.meawater.com) and their benefits in reducing costs and ongoing maintenance requirements of pipe scaling mitigation treatments. This includes a summary of preliminary water testing results, an interpretation of those results, and a discussion of their implications for measurement of charge (mV) in water.

MEA[1] Water Conditioning Devices are the culmination of the research and design efforts of Research Scientist Robert Gourlay, originally initiated in the 1990s. Through the extensive study of scientific literature and collaborative efforts with researchers in Australia, Austria, and Russia, Mr. Gourlay methodically sought out and collected information pertaining to the energy, geometry, and structure of water.

MEA Devices employ a unique configuration of magnets and copper that took nearly nine years to devise and test in order to create a permanent negative charge and other beneficial effects in water. It is well documented in scientific literature that liquid water is affected by magnetic fields.[2] [3,4,5,6]. Exposure to magnetic fields can aid in the purification of water in many capacities including removal of oil, inorganic ions, organic contaminants, and harmful bacteria.[7]

MEA Water Conditioning Devices were granted 4 Australian Innovation Patents in2016 for the following capabilities:

- To permanently hold a negative charge in water and other fluids that are predominately water
- To activate the electronic functions of microbes to sustain a negatively charged environment for plants, and increase photo synthesis and the uptake of nutrient s in water to plants
- To eliminate pathogenic microbes and hold a perm anent negative charge in raw milk so that it does not require pasteurisation or homogenisation
- To permanently hold natural energy waves in water and reduce stress levels to a normal body function.

[1] MEA= Magnetised, Energised and Activated

[2] Pang, X., & Deng, B. (2008). Investigation of changes in properties of water under the action of a magnetic field

[3] Cai, R., Yang, H., He, J., & Zhu, W. (2009). The effects of magnetic fields on water molecular hydrogen bonds. Journal of Molecular Structure, 938(1-3), 15-19.

[4] Chibowski, E., & Szczes, A. (2018). Magnetic water treatment- a review of the latest approaches. Chemosphere, 203, 54-67.

[5] Wang, Y., Wei, H., & Li, Z. (2018). Effect of magnetic field on the physical properties of water. Results in physics,8, 262-267.

[6] Biryukov, **A.** S., Gavrikov, V. F., Nikiforova, L. 0., & Shcheglov, V. **A.** (2005). New physical methods of disinfection of water. Journal of Russian Laser Research, 26(1), 13-25.

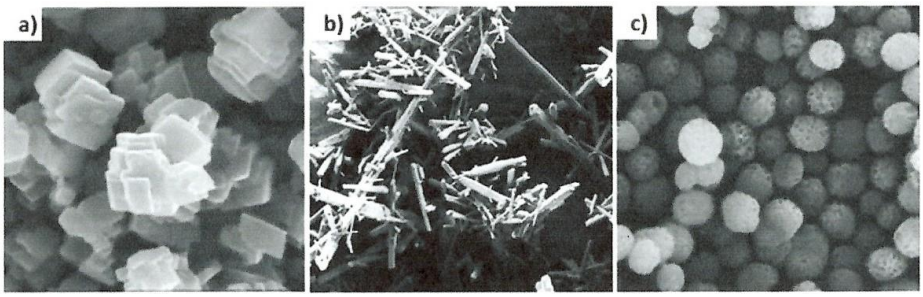
[7] Ambashta, R. D., & Sillanpaa, M. (2010). Water purification using magnetic assistance: a review. Journal of hazardous materials, 180 (1-3), 38-49.

During 2013-19 Robert Gourlay (Chief Scientist, Resonate Research Pty Ltd) has sold over 5,200 MEA devices, each individually tested for its ability to produce a permanent negative charge in water.

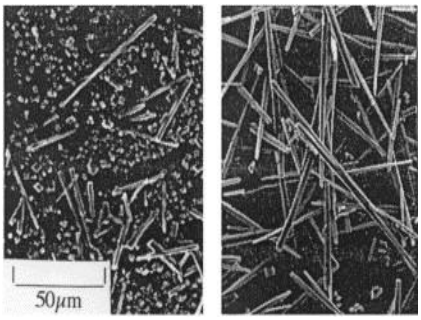
Anti-scale Magnetic Treatment (AMT) of Hard Water

It has been scientifically documented that the exposure of water to magnetic fields can halt or even reverse scale build-up.[8] [9] Magnetic fields affect the crystallisation process of calcium carbonate ($CaCO^3$) by both functionally inhibiting its precipitation and by **altering the crystalline morphology from calcite into aragonite**.[10,11,12,13,14,15]

Images of calcium carbonate ($CaCO^3$) crystal polymorphs produced using scanning electron microscopy (SEM): (a) calcite (rhombohedral), (b) aragonite (needle) and (c) vaterite (spherical).[16]



Scientific Researchers on AMT



We have established that a magnetic field effect exists. Passing water through a magnetic field subsequently favours formation of aragonite rather than calcite in our experiments, and the influence of the treatment persists for more than two hundred hours, Coey and S. Cass, 2000[17]*. The application of magnetic field treatment for scale* inhibition may provide an alternative eco-friendly scale *inhibition strategy in place of traditional chemical scale inhibitors, Al Helal, et.al, 2018*[18]*.*

Figure 2. Electron micrographs of carbonate deposits from un-treated (left) and magnetically treated (right) mineral water.[17]

Mahmoud B, Yosra M, Nadia A. Effects of magnetic treatment on scaling power of hard waters. Separation and Purification Technology. 2016 Oct 17; 171:88-92.

[9] Alimi, F., Tlili M., Amor, M. B., Gabrielli, C., & Maurin, G. (2007). Influence of magnetic field on calcium carbonate precipitation. Desalination, 206(1-3), 163-168.

[10] Alimi, F., Tlili, M., Amor, M. B., Gabrielli, C., & Maurin, G. (2007). Influence of magnetic field on calcium carbonate precipitation. Desalination, 206(1-3), 163-168.

[11] Coey, J. M. D., & Cass, S. (2000). Magnetic water treatment. Journal of Magnetism and Magnetic Materials, 209(1-3), 71-74.

[12] Kobe, S., Drazic, G., Cefalas, A. C., Sarantopoulou, E., & Stramar, J. (2002). Nucleation and crystallization of CaCO3 in applied magnetic fields. Crystal Engineering, 5(3-4), 243-253.

[13] Upus LC, Dobersek D. Influence of magnetic field on the aragonite precipitation. Chemical Engineering Science. 2007 Apr 1;62(7):2089-95.

[14] Baker JS, Judd SJ. Magnetic amelioration of scale formation. Water research. 1996 Feb 1;30(2):247-60.

[15] Higashitani, Ko, et al. "Effects of a magnetic field on the formation of CaCO3 particles." Journal of colloid and interface science 156.1(1993): 90-95.

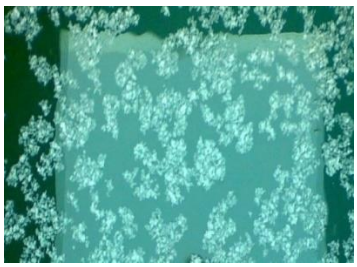
[16] Sergeeva, Alena, Anna S. Vikulina, and Dmitry Volodkin. "Porous Alginate Scaffolds Assembled Using Vaterite CaCO3 Crystals." Micromachines 10.6 (2019): 357.

[17] Coey, J.M. D., & Cass, S. (2000). Magnetic water treatment. Journal of Magnetism and Magnetic Materials, 209(1-3), 71-74.

Experiments without the permanent magnet showed an average of 3.7% difference from the average amount of calcium precipitation between the storage tanks while the use of the permanent magnet reduced the formation of scale in the hot-water storage tanks with an average of 34%. The maximum reduction in scale formation was 70% and the minimum 17%. Smith et al, 2003.[19] *Results showed that magnetic treatment affects calcium carbonate crystallization. The RCP tests confirmed that the scaling power of the magnetically treated water was inhibited. Experimental results also indicated a significant improvement in the bacteriological quality of the treated water. Bali and Moncef, 2018.*[20]

It was found that magnetic field enhanced scale removal from pipe walls by 46.7% ... Magnetic technology is so simple, cost-effective, and environmentally friendly treatment approach for clean water production with significant scale removal efficiency. Magnetic treatment can be used either as a stand-alone technology or in water purification systems. Sohaili et al 2016.[21] *The most plausible (mechanism) is (interfacial effects), in which the interaction of the magnetic field with the charged species present (ion clusters and crystallites) affects crystal nucleation and subsequent growth. The reported scale inhibition (and descaling) then occurs as a result of magnetically-produced hydrophilic discrete scale particles of substantially different size and crystal morphology to untreated systems, in which more adherent crystals are generated. Bake and Judd 1996*[22] *The formation of aragonite structure of CaCO3 crystals is accelerated by the magnetic exposure." Higashitani et al 1993*[23]*.*

AMT and MEA Devices



Left is a photograph of dislodged pipe scale (Calcite) floating on a tank once converted to Aragonite by a MEA water device. Traditional scaling treatments require the addition of various water-softening chemicals, expensive machinery, and/or extensive ongoing maintenance costs. Magnetic water conditioning uses the effects of a permanent magnetic field on *hard* minerals to mitigate scaling, requiring no continual maintenance costs.

MEA devices have consistently been observed and measured to dislodge scale deposits in domestic and agriculture water systems. It is theorised that this is achieved through altering the calcium carbonate crystalline morphology from Calcite to Aragonite, a less adherent crystal (described above). Due to the specialised nature of the laboratory equipment required to verify polymorph forms, the understanding of MEA device effects on scaling remains theoretical in nature, though more extensive research is currently in development

[18] Al Helal, Ammar, et al. "Influence of magnetic fields on calcium carbonate scaling in aqueous solutions at 150° C and 1 bar." Journal of colloid and interface science 509 (2018): 472-484.
[19] Smith, C., P. P. Coetzee, and J. P. Meyer. "The effectiveness of a magnetic physical water treatment device on scaling in domestic hot-water storage tanks." Water SA 29.3 (2003): 231-236.
[20] Bali, Mahmoud, and Moncef Gueddari. "The effect of magnetic treatment on the physico-chemical and microbiological characteristics of hard waters." Separation Science and Technology 53.9 (2018): 1405-1411.
[21] Sohaili, Johan, et al. "Removal of scale deposition on pipe walls by using magnetic field treatment and the effects of magnetic strength." Journal of cleaner production 139 (2016): 1393-1399.
[22] Baker, John S., and Simon J. Judd. "Magnetic amelioration of scale formation." Water research 30.2 (1996): 247-260.
[23] Higashitani, Ko, et al. "Effects of a magnetic field on the formation of $CaCO_3$ particles. "Journal of colloid and interface science 156.1 (1993): 90-95.

Testing Purpose and Methodology

MEA devices are currently of interest due to their potential de-scaling properties (described above), particularly as they might apply to rooftop adiabatic cooling systems. Although the de-scaling properties of the device cannot be verified through standard chemical water tests, some other effects of the device can be observed.

After extensive communication between the various involved parties, the decision was made not to conduct costly testing, but rather a simple, preliminary before-and-after test to get a general idea of how the water might be affected by the device. This preliminary testing was conducted by Australian Laboratory Services Pty Ltd (ALS) and consisted of some basic water chemistry analyses (see **Table 1**). The Phi'on Laboratory conducted two tests as part of their standard operating procedure (SOP).

Table 1. Chemical Testing Parameters

Parameter	**Test Type**	**Conducted By**
pH	Chemical	External Laboratory/ ALS
Electrical Conductivity	Chemical	External Laboratory/ ALS
Hardness (combined Ca and Mg)	Chemical	External Laboratory/ ALS
Total Dissolved Solids	Chemical	External Laboratory/ ALS
Major Cations (Ca+, Mg+, Na+, K+)	Chemical	External Laboratory/ ALS
Major Anions (Cl-, SO_4^-, Alkalinity)	Chemical	External Laboratory/ ALS
Silica	Chemic al	External Laboratory/ ALS
ORP	Chemical	Phi'on Laboratory
mV	Chemical	Phi'on Laboratory

* *Note that tests which are conducted by external laboratories should be executed using their standard protocols and procedures.*

Table 2. Testing Schedule

Test Number	**Test Date**	**Test Parameters**	**Purpose**
1	1 Week Prior to treatment	Chemical	Pre-treatment value establishment
2	4 Week Post treatment	Chemical	Immediate post-treatment results

Results

It should be noted that all measurements are from a simple before-and-after test of urban water (undertaken by Australian Laboratory Services: ALS) however, these tests should be considered preliminary as further sample testing needs to be undertaken for comparison. Therefore, an expanded test plan will be employed to determine the significance of the observed changes.

The largest observable changes occurred in the analytes of **Chloride (Cl-) and Ionic Balance** (see **Table 3,** page 5).

Table 3. Preliminary Test Results

Anaslyte	Analyte	Unit	Before	After	%
Total dissolved solids dried at 180±5°C	Total dissolved solids 180^0C	mg/L	285	271	-4.91
Total hardness as $CaCO^3$	Total Hardness as CaCO3	mg/L	140	133	-5.00
	Hydroxide alkalinity as $CaC0^3$	mg/L	<1	<1	NA
	Carbonate Alkalinity as $CaC0^3$	mg/L	<1	<1	NA
	Bicarbonate Alkalinity as $CaCO^3$	mg/L	104	95	-8.65
	Total Alkalinity as $CaC0^3$	mg/L	104	95	-8.65
Alkalinity by PC titrator	Sulfate as S04 - Turbidimetric	mg/L	24	25	4.17
Chloride by discrete analyser	Chloride	mg/L	90	70	-22.22
Dissolved major cations	Calcium	mg/L	28	27	-3.57
	Magnesium	mg/L	17	16	-5.88
	Sodium	mg/L	47	49	4.26
	Potassium	mg/L	4	4	0.00
Silica by discrete analyser	Reactive silica	mg/L	1.89	1.76	-6.88
Ionic balance	Total anions	meq/	5.12	4.45	-13.09
	Total cations	meq/	4.94	4.90	-0.81
	Ionic balance	%	1.72	4.81	**+ 179.65**

Discussion of treatment test results

While the nature of these tests does not allow statistically significant statements about the change in water quality, there is a notable difference between the before and after results. The two most dramatic changes between the before and after tests are seen in the Chloride and Ionic Balance values. These changes could potentially be explained by (1) the effects of magnetic fields on the inter-molecular behavior of liquid water and {2) the charged chemical species present (ion clusters and crystallites). 24 25 26 27. One of the most significant changes between the two water samples was the ionic balance, which showed a percent change of +179.65%. Traditionally, ionic balance calculations are based on the widely accepted concept that within a water sample, the number of positively charged ions in solution (cations) should balance the number of negatively charged ions (anions), ie. the water must be electrically neutral. While some labs operate under the parameters of+/- 10% being acceptable regardless of anion or cation levels, others consider that with an anion sum of 3.0-10.0 meq/L, a percent difference (ionic balance) value of +/ - 2% is considered acceptable. If we were to interpret these results using the more stringent methodology, the after-installation test would fall outside the acceptable parameters. This either indicates an error in the testing, or that there is a mineral or ion transformation factor influencing the ionic balance. The MEA device and its interfacial effects on the ions and ion clusters (eg. permanent net negative charge of the water) could be the cause of this dramatic shift in ionic balance, although more research would be necessary to confirm this theory.

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[24] Baker, Joh n 5., and Simon J. Judd. "Magnetic amelioration of scale formation." Water research 30.2 (1996): 247-260.

[25] Szczes, A., Chibowski, E., Hotysz, L., & Rafalski, P. (2011). Effects of static magnetic field on water at kinetic condition. Chemical Engineering and Processing: Process Intensification, 50(1), 124-127.

[26] Ozeki, S., Wakai, C., & Ono, S. (1991). Is a magnetic effect on water absorption possible? The Journal of Physical Chemistry, 95(26), 10557-10559.

[27] Higashitani, K., Oshitani, J., & Ohmura, N. (1996). Effects of magnetic field on water investigated with fluorescent probes. Colloids and Surfaces A: Physicochemical and Engineering Aspects, 109, 167-173.

The biggest takeaways from this testing are:

- The observed changes in the water quality can be attributed to the MEA devices (although more research and documentation would be needed to confirm this thesis)
- The observed changes in water quality do not adversely affect the existing water infrastructure system. The MEA water device has an Australian Industry Certification (No. 23400) that validates this claim.

Understandable contention surrounds the use of anti-scale magnetic treatment (AMT) although considerable published evidence suggests it can often be effective, depending on the device capabilities. However, AMT remains controversial, despite considerable published evidence suggesting its effectiveness. It therefore remains in experimental stages for both industry and peer reviewed science. However, there is no denying that scale inhibiting effects have been observed and documented consistently under experimental and commercial conditions.

We suggest that the main champions and authors of innovation are often industry with a vested interest in efficacy and cost savings. Further, implementation of better environmental practices are becoming an increasingly important factor in industry public relations programs. Therefore, a long-term comparative analysis and documentation program is recommended to be incorporated into routine scaling maintenance and water chemistry testing schedules already established with clients. Such would also be recommended to substantiate cost savings, stability, and reliability of alternative scaling management methods to support less costly maintenance.

Very little research has been done on the assimilation of AMT with reverse osmosis (RO) machinery, but it has been suggested that AMT could provide an ideal solution for the prevention of RO scaling, specifically in conditions where the membrane is liable to clog with crystalline material.[28] Therefore, a MEA device could be utilised in tangent with reverse-osmosis machinery, albeit that RO may not be necessary in the presence of structured water from an MEA device.

Similarly, very little research has been undertaken on the effects of sunlight on structured water, eg. water flowing in a stream or in the ocean. The reason positive and negative charges are attracted to each other is that they both *give off* these fields. An electron creates an electric field that attracts positive charge, and a proton creates an electric field that attracts negative charge. Moving charges create magnetic fields. Also, a changing electric field creates a magnetic field and vice versa. If a charge is accelerated, it creates a combination of changing electric and magnetic fields that sustain each other, this is called an electromagnetic wave. Light is just a different frequency of these waves. When **water is structured, it takes on a blue/green colour** because it is emitting oxygen (O) light photons, and if the colour stays blue permanently, then the water is permanently structured with a -mV charge and not oxidising. That is, a **portion of the absorbed light is re-emitted as fluorescence or** excitation blue/green light from the increased oxygen and anions in the structured water. Consequently, the unique crystalline structure in the water, increased oxygen, and anions (all negatively charged) are the cause of the re-emitted light.

[23] Baker, John S., Simon J. Judd, and Sim on A. Parsons. "Anti-scale magnetic pretreatment of reverse osmosis feed water. "Desalination 110.1 - 2 (199): 151-165.

Discussion

The current state of water science

The first thing one must recognise when entering the realm of water science is, that no one really understands water.[29] Brian Josephson (winner of the Nobel Prize for Physics in 1973 and Professor at Cambridge University) observed: *Scientists have little knowledge on the topic of water, and they tend to have a naive vision:* liquid composed of *H_20 molecules more or less isolated in movement. In reality, water as a phenomenon is a lot more complex, with single molecules grouped temporarily to form a lattice structure. It is not at all surprising that these molecules can interact, thus giving rise to a mechanism that allows water to have memory, although the existence of such a mechanism only rings true to well-informed scientists who don't underestimate the possibility of its existence*[30].

Water is often erroneously perceived to be a mundane, well-understood, normal-behaving molecule. In reality, its behaviour is highly complex, thoroughly debated, and inarguable unique and strange.[29,31,32]

There are anomalous properties of water at every phase of its existence. It expands upon freezing, its highest density is in the liquid phase at 4°C, it's incredibly light in the gaseous form, it has an abnormally high heat capacity, an atypical viscosity, and the list goes on. Though the scientific community generally agrees that this anomalous behaviour is inextricably linked to water's intermolecular hydrogen-bonding, the jury is still out as to how these molecular-level relations take form and influence bulk water-scale behavior.[29,31,33,34,35]

The current state of water science is an excellent example of how scientific understanding can make leaps and bounds in very particular aspects of a subject, while deeper, more fundamental questions elude explanation.[29,31] One must know that science does not have the subject of water neatly tied up. There remains much uncharted territory to explore. This has led many experts on liquid theories to shrink away from studying water, because it's *just too strange*. However, its abnormality is exactly the thing that has motivated others to search for answers to all the questions that arise from water's strange behaviour.

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[29] Ball, P. (2008). Water: water an enduring mystery. Nature, 452(7185), 291.
[30] Benveniste, J. (2013). Preface. Ma verite sur la" memoire de l'eau". Albin Michel.
[31] Pollack, G. H. (2013). The Fourth Phase of Water. Ebner & Sons Publishers, Seattle, Washington.
[32] Pang, X., & Deng, B. (2008). Investigation of changes in properties of water under the action of a magnetic field. Science in China Series G: Physics, Mechanics, and Astronomy, 51(11), 1621-1632.
[33] Franks, F. (1975). (ed.) Water: A Comprehensive Treatise Vol. 1. Plenum Press,New York.
[34] Stokely, K., Mazza, M. G., Stanley, H. E., & Franzese, G. (2010). Effect of hydrogen bond cooperativity on the behaviour of water. Proceedings of the National Academy of Sciences, 107(4), 1301-1306.
[35] Brovchenko, I., & Oleinikova, A. (2008). Multiple phases of liquid water. ChemPhysChem, 9(18), 2660-2675.

Water voltage and negative charge

The ability of water to receive, store and release charge, though often viewed with skepticism, has been scientifically demonstrated and observed.[36] One of the best examples of water's ability to receive, store and release charge is found in the atmospheric sciences: lightning. The charge entrained and stored in neighbouring clouds creates inter-cloud potential differences on the order of millions of volts, resulting in the subsequent discharge of that voltage in the form of lightening. The subsequent discharge (lightening) is evidently more intense.[37] The standard H_2O molecule implies charge neutrality, as two positive hydrogen atoms are balanced by one negative, but larger, oxygen atom.

However, if we consider water in a highly ordered phase as described above, the ratio becomes H_3O_2, which is has a negative balance. Therefore, a permanent negative charge indicates highly ordered, hexagonal, structured water.[38] The Phi'on laboratory verified the net negative charge (-mV) of the water using their specifically developed testing technology and methodology (see images below).

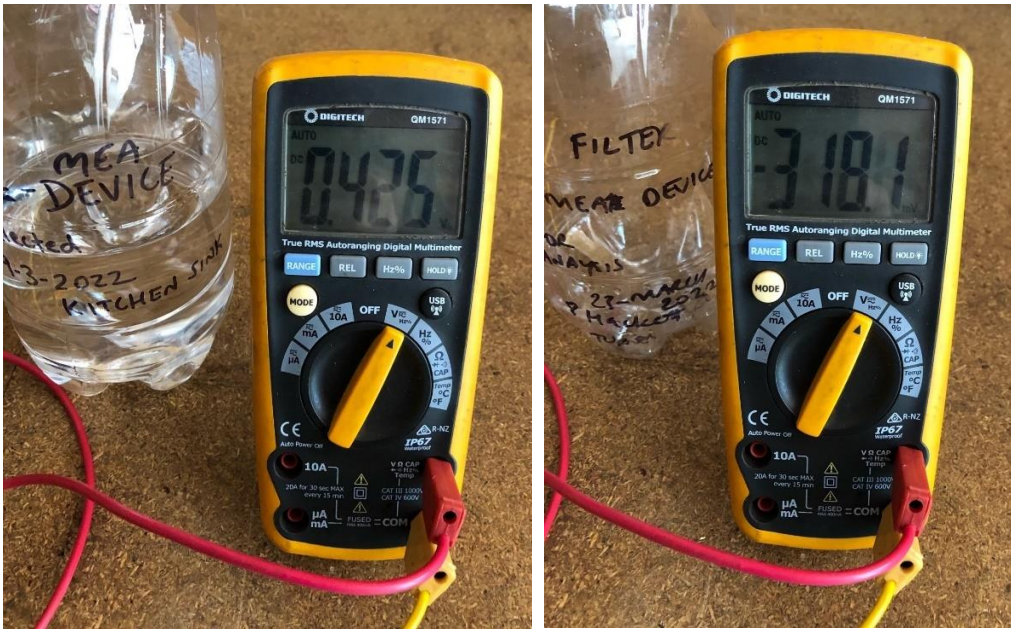

Figure 4. Phi'on Laboratory test results for water sample taken *4 weeks after MEA device installation. The **left image** is the voltage (+425mV) of the sink tap water **before** the MEA device was installed. The **right image** is the voltage (-318mV) from sink water **after** the MEA water device was installed.*

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[36] Ovchinnikova, K., & Pollack, G. H. (2008). Can water store charge? Langmuir, 25(1), 542-547.
[37] Ovchinnikova, K., & Pollack, G. H. (2009). Reply to Comment on Can water store charge? Langmuir, 25(18), 11202-11202.
[38] Pollack, G. H. (2013). The Fourth Phase of Water. Ebner & Sons Publishers, Seattle, Washington.

Comparative test using seawater

The table below shows the comparison between raw (un-treated) concentrated seawater (1) and the same seawater after treatment with a MEA water device (2). The % change is shown (3).

The raw un-vortexed, concentrated seawater was treated with a 2" inner diameter MEA water device for about 2 hours. This involved pumping and continuous cycling of 1,000L of the concentrated seawater through the MEA device. The sea water was in a 1000L IBC container and exposed to sunlight energy.

COMPOUND	MEA treated (2)	% Change (3)	Untreated (1)	DEAD SEA	AVG SEAWATER
Sulfate as SO_4	34,000	**+90.0**	17,900		27,010
Chloride	217,000	**+1.4**	214,000	230,400	193,450
Calcium	58	**-3.3**	60	17,600	42
Magnesium	87,700	**+0.6**	87,200	45,900	12,950
Sodium	6,790	**-12.6**	7,770	36,600	10,752
Potassium	8,930	**+3.8**	8,600	7,800	3,900
Totals	**354,478**	**+5.65**	**335,530**	338,300	248,104

The increase of 5.65 % in the major minerals of seawater is significant, and specifically the **90% increase in Sulphate as SO^4, an anion**. Also, **sodium (a cation) has decreased by 12.6%.**

The effects may be accounted for by:

1. The restructuring of the water from a pentagonal (5 sided crystal) structure to a hexagonal (six sided) structured water state
2. The re-structured water now having a permanent negative (-mV) charge (ie. increase in anions and oxygen in the structured water)
3. The effects of sunlight entrained to the seawater during the treatment/structuring process. Photons interact with charged particles and transfer their energy. In short, photons may be the electromagnetic force carrier or messenger involved in **mineral or ion transformation**.

Conclusion

There are a number of key concepts in **conventional science** about water, ie.

- *The water molecule, as a whole, has 10 protons and 10 electrons, **so it is neutral**.*
- *In a water molecule, the oxygen atoms and hydrogen atoms share electrons in covalent bonds, but the sharing is not equal.*
- *In the covalent bond between oxygen and hydrogen, the oxygen atom attracts electrons a bit more strongly than the hydrogen atoms.*
- *The unequal sharing of electrons gives the water molecule a slight negative charge near its oxygen atom and a slight positive charge near its hydrogen atoms.*
- *When a neutral molecule has a positive area at one end and a negative area at the other, it is a polar molecule.*
- *Water molecules attract one another based on the attraction between the positive end of one water molecule and the negative end of another*.

Most experiments with water involve either pure (distilled) or destructured (urban) water. It could be that these experiment conditions have led to the assumption that, in the case of pure/natural water, **there are always the same concentrations of hydrogen ions and hydroxide ions** and therefore, the water is still neutral (pH = pOH), even if its pH and ORP changes. However, as discussed in this paper the measurements of water voltage (ie. measurements before and after treatment with a magnetic conditioning device) provide **different results or observations to conventional water science theories**.

As previously mentioned, there are other states of still water after treatment with a magnetic energy, that replicate the states of water when it is flowing in nature (eg. a stream or ocean). The measurement system of water quantum states is based on dynamic processes in the water electron subsystem in a state of exchange interaction with the natural background of electrons, as well as changes in water thermodynamic, electrochemical, and structural-physical (crystalline) characteristics.

Structured water has a capacity to receive, store and transmit information (ie. entrain energy).[39, 40] Consequently, water has a collective unconsciousness and knowledge that is innate.[40] This consciousness creates a capacity of water to transform from an unstructured/de-structured water state into a quantum, structured water state, and this includes the restoration of its natural ionic balance (ie. reducing cations ions to a net anion, negative charge state as in Table 3, page 5). Once water has been conditioned with a MEA water device the water is in a **syntropy** state that it exists in nature, as a flowing (ie. with current and turbulence) structured water. Therefore, it is most likely that when water is taken from its natural, vortex, flowing state (ie. all urban drinking water) the water will lose anions and convert to an **entropy**, unstructured state (pentagonal crystalline structure) with a positive (+mV) charge. This change in charge can occur within 60 hours (2.5 days). However, it is the natural, structured water state that is essential for cell function, and this can be achieved with the unique MEA water conditioning device. See device image below.

MEA water has a **permanent negative charge and therefore does not oxidise**. This includes other liquids like wine. It is this unique property of MEA water devices that makes them a leader in wastewater treatment, food production and drinking water for humans and animals.

Further information on the structure of water is on the MEA water website, www.meawter.com

[39] Voeikov, V & Korotkov. The Emerging Science of Water, 2017

[40] Austin, V. The Secret Intelligence of Water. *Macroscopic evidence of water responding to human consciousness, 2020*.