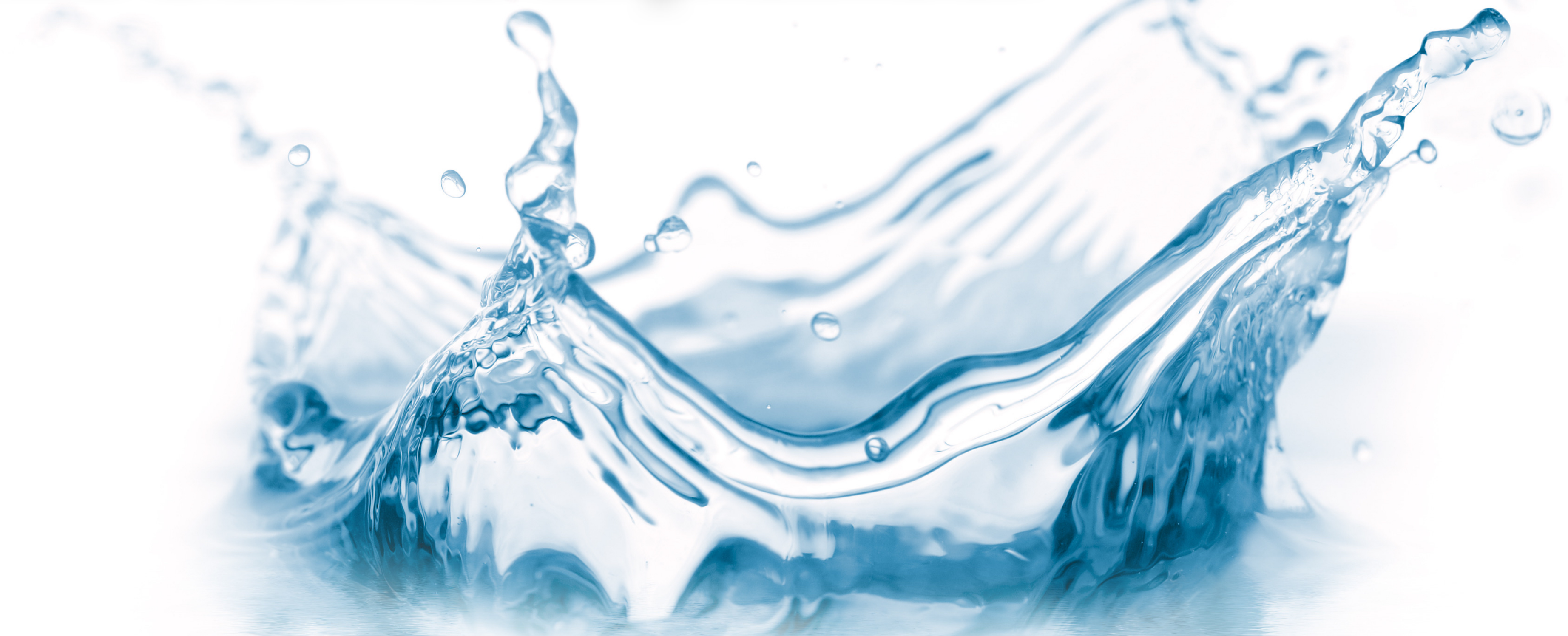


**E - C L E A R** **ON**  
TECHNOLOGIES OXYGEN

*Healthy Water. Healthy Earth. Healthy You!*

# **E - Clear Technologies**

***The Science Explained!***



# SANITIZER SCIENCE

**4 SEPERATE, ORGANIC, NATURAL, CHEMICAL FREE PROCESSES TO SANITIZE AND PURIFY WATER**

**EACH SEPARATE PROCESS INDIVIDUALLY RECOGNISED BY REGULATORY AUTHORITIES AS A WIDELY ACCEPTED METHOD OF WATER PURIFICATION**



Using an advanced electrolysis process the e-clear oxygenator technology generates powerful natural oxidizers, hydroxyl (OH), atomic oxygen (O1), hydrogen peroxide (H2O2) and oxygen (O2) from the water molecule itself.

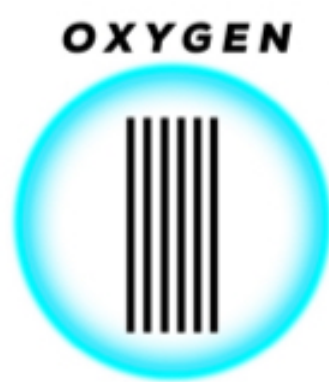
Dissolved oxygen in the pool is combined with copper ionization to provide a long lasting healthy and natural sanitizing residual in the water.

Since e-clear oxidizers are more powerful than chlorine or ozone and since e-clear produces a sanitizing residual in the water e-clear pools do not require chlorine or other sanitizing chemicals.

The unique feature of e-clear is that swimmers are only exposed to the healthy sanitizing residuals – dissolved O2 and the copper ionization, since OH, O1 and H2O2 are produced within a sealed chamber away from the swimmer.

The powerful oxidizers, OH, O1 and H2O2, combined with O2 and copper, effectively inactivates algae, viruses, bacteria, yeast, fungi, protozoa and pathogens

**EQUIPMENT**



**OXYGEN**  
E-CLEAR PATENTED: 2003/2934



**REACTION**



**PRODUCT**



**CLEANSING ACTION**

Smaller amounts of HYDROGEN PEROXIDE is produced, Readily converting back into H2O Leaving little residual effect. Can also be added as a Liquid to boost the E-Clear System

**MOLECULAR OXYGEN** is a powerful stable Oxidiser producing a high ORP in water. A high Oxygen Residual is maintained In the water, disinfecting and super-oxygenating The water.

The **HYDROXYL ION** is a very powerful yet shortlived oxidiser. Far more powerful than chlorine or ozone it quickly converts back into H2O, leaving no residual effect

**ATOMIC OXYGEN** an oxidant more powerful than chlorine or ozone. Quickly converts back into H2O leaving no residual effect A byproduct of the AOP PROCESS

Developed by NASA for the Apollo missions Copper Ionization is the most effective means in destroying algae, fungi, viruses, bacteria and protozoa in water .

A low 0.5ppm residual is maintained, well below the 2.0ppm maximum level stipulated by the EC98/83 Directive for human consumption.

Since a residual of copper is maintained constantly in the water, microorganisms DNA is disrupted making them Unable to reproduce and thus are quickly eliminated

Copper is a widely accepted method of safely controlling microorganisms, without the addition of dangerous chemicals, in many industries.

A low 50ppb residual is maintained in the water.

Silver is world's most powerful anti-bacterial agent.

An immune booster, treats psoriasis, excema, heals wounds quickly and safely. Anti-virus, anti- inflammatory, treats and prevents sinus infection and allergies. The system produces colloidal silver which can be safely drunk to promote general well being and good health.

Silver Ionization is widely accepted around the world in almost all industries and in all countries, as a safe, chemical free method of saitization.

Silver effectively disables the DNA of Microorganisms

Approved by numerous agencies worldwide, including the US FDA As a primary means of purifying water.

Chemical free disinfection. Quick, reliable , cost effective.

Ultraviolet energy affects the genetic core of microorganisms rendering them unable to function.

More effective than chlorine in destroying microorganisms.

Helps break down oils and fats in the water.

Effectively destroys chloramine gas and prevents its production.

Kills 99.99% of algae, bacteria, viruses and protozoa suspended in the water column.

**RESULT**

**ORGANIC, SUPER-SOFT, NATURAL, SPARKLING, CLEAN OXYGEN-RICH WATER**



**WATER FREE OF MICROORGANISMS**



**WATER THAT HEALS THE BODY**



**WATER THAT'S SAFE TO DRINK**



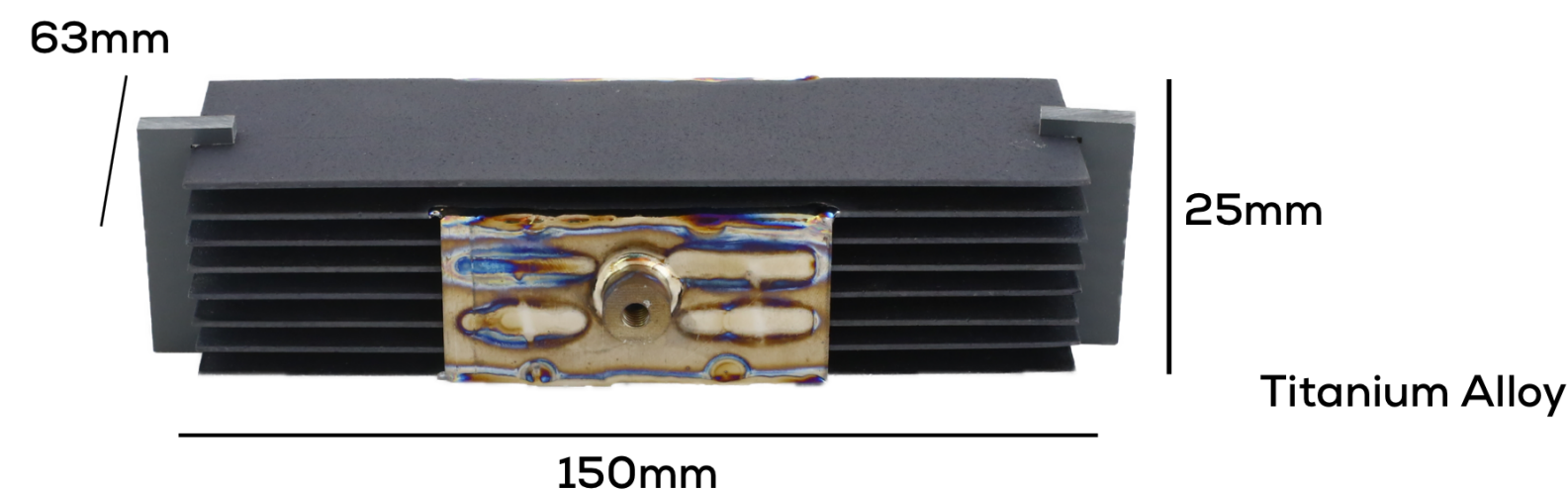
Healthy Water. Healthy Earth. Healthy You!

## OXYGEN ELECTRODES



### 63MM OXYGEN STACK ELECTRODE SET

To fit all MK-63 model E-Clear systems from 2014- present



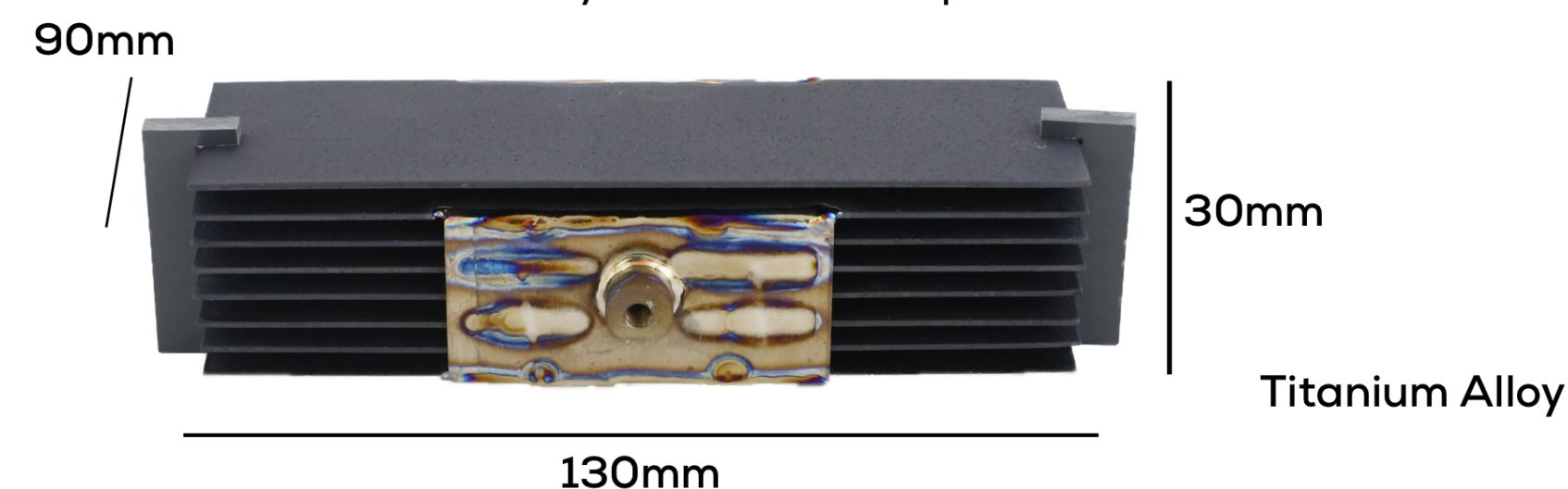
WEIGHT: 150g

Assembled in South Africa.



### 90MM OXYGEN STACK ELECTRODE SET

To fit all MK-150, MK-250, MK-500, MK-750 and MK-1000 model E-Clear systems from 2014- present



WEIGHT: 200g

Assembled in South Africa.

# A.O.P.

## Advanced Oxidation Processes

Advanced oxidation processes are a group of chemical treatment techniques used to remove various pollutants from water. They are effective in treating recalcitrant and toxic substances that are resistant to conventional water treatment methods. AOPs rely on the generation of highly reactive hydroxyl radicals ( $\cdot\text{OH}$ ) that can oxidize organic and inorganic contaminants present in water into less harmful products.

E-Clear employs the use of titanium dioxide ( $\text{TiO}_2$ ) photocatalysis, which involves the irradiation of  $\text{TiO}_2$  nanoparticles with UV light to create hydroxyl radicals. Additionally, there is the use of peroxides like hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) or persulfate ( $\text{S}_2\text{O}_8^{2-}$ ) combined with catalysts to generate hydroxyl radicals.

The hydroxyl radicals produced during AOPs exhibit high reactivity and short lifespans, making them effective in breaking down pollutants. These radicals attack the chemical bonds of the contaminants, leading to their degradation into simpler, less harmful compounds like carbon dioxide, water, and mineral salts.

One of the main advantages of AOPs is their ability to treat a wide range of pollutants, including persistent and toxic substances that are challenging to remove using traditional methods like coagulation, filtration, and chlorination. AOPs also do not generate harmful by-products like some conventional treatment methods can.

However, AOPs have certain limitations and challenges. They often require energy-intensive processes, and the cost of implementing AOPs can be relatively high compared to conventional methods.

E-Clear Technologies' Advanced oxidation processes offer an effective and versatile approach for treating water contaminated with complex and persistent pollutants. As research and technology continue to evolve, AOPs will become the go to process of cleaning water.



## The Benefits of Hydroxyl Ions in Environmental Remediation and Healthcare

Hydroxyl ions ( $\text{OH}^-$ ) are potent chemical species with remarkable benefits that have garnered significant attention across various scientific disciplines. These highly reactive radicals play a crucial role in environmental remediation and healthcare applications. This essay delves into the multifaceted advantages of hydroxyl ions, exploring their potential in breaking down pollutants, neutralizing harmful pathogens, and promoting sustainable practices.

### 1. Environmental Remediation:

Hydroxyl ions are central to advanced oxidation processes (AOPs) used in water and air treatment. In AOPs, hydroxyl radicals ( $\cdot\text{OH}$ ) are generated to oxidize and decompose diverse organic and inorganic pollutants. These radicals effectively break down complex contaminants like pesticides, pharmaceuticals, and industrial chemicals, converting them into safer by-products such as carbon dioxide, water, and mineral salts. As a result, hydroxyl ions provide a sustainable and efficient solution for purifying contaminated water and air, reducing the environmental impact of harmful substances.

### 2. Air Quality Improvement:

In urban environments, hydroxyl ions contribute to the self-cleaning capacity of the atmosphere. They play a crucial role in the troposphere by initiating the breakdown of volatile organic compounds (VOCs), which are major contributors to air pollution and smog formation. Hydroxyl radicals react with VOCs, breaking them down into simpler, less harmful molecules, thus mitigating the adverse effects of air pollution on human health and the environment.

### 3. Health and Sanitization:

Hydroxyl ions also exhibit potent antimicrobial properties, making them valuable in healthcare settings. Their ability to penetrate cell walls and disrupt the structure of pathogens, such as bacteria and viruses, leads to their neutralization. As a natural sanitizing agent, hydroxyl ions offer a promising alternative to chemical disinfectants, reducing the risk of antimicrobial resistance and ensuring a safer environment for patients and healthcare professionals.

### 4. Hydroxyl Radicals and Cancer Treatment:

Recent research has explored the potential of hydroxyl radicals in cancer treatment. Scientists are investigating the use of hydroxyl ions to target and destroy cancer cells selectively. By inducing oxidative stress, hydroxyl radicals could trigger apoptosis (programmed cell death) in cancerous cells while sparing healthy ones. Although still in its early stages, this avenue holds promise for the development of more targeted and efficient cancer therapies.

### 5. Hydroxyl Ions in Industrial Applications:

The industrial sector benefits from hydroxyl ions in various processes. For example, in semiconductor manufacturing, hydroxyl radicals are used for cleaning and purifying surfaces before deposition, leading to improved product quality and yield. Furthermore, they play a role in the treatment of industrial wastewater, helping to remove persistent organic pollutants, heavy metals, and toxic compounds, thus contributing to sustainable industrial practices.

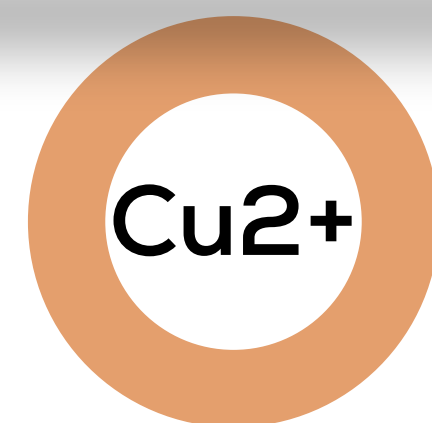
Hydroxyl ions stand as an extraordinary force of nature, offering numerous benefits across environmental, healthcare, and industrial domains. As potent agents of oxidation, these radicals prove indispensable in advanced oxidation processes for water and air treatment, leading to improved environmental quality. Moreover, their antimicrobial properties pave the way for safer healthcare practices and potential cancer treatment breakthroughs. In industries, hydroxyl ions facilitate cleaner production processes and contribute to sustainable waste management. As we continue to explore and harness the power of hydroxyl ions, E-Clear Technologies will unlock new avenues for addressing global challenges, advancing human health, and fostering a more sustainable future.

# 20 Reasons Why **AOP** (ADVANCED OXIDATION PROCESSES) is **Better** than all other Water Sanitizing Methods.

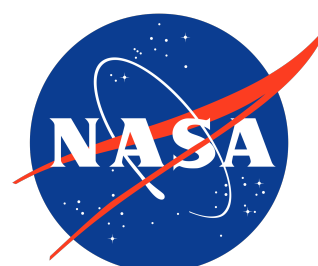
Advanced oxidation processes (AOPs) are considered the best way of cleaning water for several key reasons, surpassing traditional methods like chemicals, chlorinators, ozone, and chlorine:

- 1. Comprehensive contaminant removal:** AOPs effectively target a wide range of pollutants, including organic compounds, pesticides, pharmaceutical residues, and industrial chemicals. They can break down complex and persistent contaminants that may resist conventional treatment.
- 2. Non-selective and rapid action:** AOPs generate highly reactive hydroxyl radicals, which indiscriminately attack and degrade contaminants. This non-selective nature allows them to tackle a broader spectrum of pollutants more rapidly than other methods.
- 3. Byproduct minimization:** Unlike some chemical-based treatments, AOPs often produce fewer harmful byproducts during the degradation process. This leads to a cleaner treated water output and reduces potential environmental impacts.
- 4. Independence from chemical additions:** AOPs do not rely on continuous dosing of chemical disinfectants, which can reduce the risk of creating undesirable byproducts and minimize chemical handling and storage requirements.
- 5. Environmentally friendly:** AOPs are more eco-friendly than some traditional methods, as they do not introduce additional chemicals into the environment and promote the breakdown of pollutants into harmless substances.
- 6. Improved pathogen inactivation:** AOPs can effectively inactivate various waterborne pathogens, enhancing the safety of the treated water and providing an additional layer of protection against microbial contamination.
- 7. Robust performance across water quality variations:** AOPs are generally less affected by fluctuations in water quality parameters, such as pH and temperature, ensuring consistent and reliable treatment performance.
- 8. Decreased reliance on chlorine:** By utilizing AOPs, the need for high chlorine dosages can be reduced, leading to a decrease in the formation of potentially harmful disinfection byproducts (DBPs).
- 9. Scalability and adaptability:** AOPs can be adapted to different water treatment systems and scales, making them suitable for various applications, including municipal water treatment, industrial processes, and wastewater treatment.
- 10. Residual contaminant removal:** AOPs have the capability to target and eliminate residual contaminants that might persist after conventional treatment methods. This ensures a higher degree of water purity and safety.
- 11. Odor and taste improvement:** AOPs can effectively eliminate unpleasant odors and tastes caused by organic compounds, providing aesthetically pleasing and better-tasting water.
- 12. Versatility in water sources:** AOPs can be applied to various water sources, including surface water, groundwater, and even highly contaminated wastewaters, making them a versatile solution for diverse water treatment challenges.
- 13. Decentralized treatment options:** AOPs can be designed as decentralized treatment systems, suitable for smaller communities or remote areas without access to centralized water treatment facilities.
- 14. Lower sludge generation:** AOPs typically produce less sludge compared to conventional chemical treatments, reducing the costs and environmental impacts associated with sludge disposal.
- 15. Enhancing water recycling:** AOPs facilitate water recycling efforts by efficiently breaking down pollutants, enabling treated water to meet stringent quality standards for reuse in various non-potable applications.
- 16. Synergy with other treatment methods:** AOPs can be combined with other treatment technologies like activated carbon adsorption or membrane filtration to achieve even higher levels of water purification and efficiency.
- 17. Energy-efficient options:** Some AOPs, such as photocatalytic processes, can be powered by renewable energy sources like solar energy, reducing the overall environmental footprint of the water treatment process.
- 18. Long-term stability:** AOPs are known for their long-lasting performance and stability over time, providing a reliable and consistent solution for water treatment needs.
- 19. Removal of emerging contaminants:** AOPs have demonstrated effectiveness in removing emerging contaminants, such as pharmaceuticals and personal care products, which are increasingly becoming a concern for water quality.
- 20. Compliance with stringent regulations:** AOPs' ability to effectively remove a wide range of contaminants helps water treatment plants meet and exceed stringent regulatory requirements for water quality standards.

Overall, the combination of these advantages makes advanced oxidation processes a highly efficient, sustainable, and reliable solution for cleaning water, ensuring the protection of public health and the environment. As technology continues to advance, AOPs are likely to play an increasingly significant role in addressing emerging water quality challenges.



# COPPER IONIZATION



E-Clear Technologies Copper ionization is a water treatment technique that utilizes the antimicrobial properties of copper ions ( $\text{Cu}^{2+}$ ) to provide numerous benefits in water disinfection and purification. The process involves releasing controlled amounts of copper ions into the water, which then interact with microorganisms to eliminate or inhibit their growth. Below is a detailed science explanation of the benefits of copper ionization in water treatment:

## 1. Effective Microbial Control:

Copper ions have strong biocidal properties, making them effective in controlling a broad spectrum of microorganisms, including bacteria, viruses, and algae. When copper ions are introduced into the water, they disrupt the cell membranes and enzymatic functions of these microorganisms, leading to their inactivation or death. As a result, copper ionization serves as an efficient method to reduce the microbial load in water, improving its overall quality and safety for various applications.

## 2. Long-Lasting Protection:

One of the significant advantages of copper ionization is its long-lasting protection. Unlike some chemical disinfectants that rapidly dissipate in water, copper ions remain active for an extended period. This sustained efficacy allows copper ionization systems to provide continuous water treatment, ensuring a consistent level of microbial control over time.

## 3. Reduced Chemical Dependency:

Copper ionization reduces the dependence on chemical disinfectants, such as chlorine or bromine, for water treatment. While these chemicals are effective in killing microorganisms, they can produce harmful disinfection by-products (DBPs) when reacting with organic matter in the water. Copper ionization offers a more environmentally friendly alternative by minimizing the use of these chemicals and reducing the potential health risks associated with DBPs. And when combined with E-Clear's Patented Oxygen Electrodes, provides a completely CHEMICAL FREE method of Sanitizing Water completely.

## 4. Biofilm Prevention:

Biofilms are slimy layers formed by colonies of microorganisms that adhere to surfaces, such as pipes, filters, and water fixtures. These biofilms provide a protective environment for microorganisms, making them resistant to conventional disinfection methods. Copper ionization helps prevent biofilm formation and gradually breaks down existing biofilms. By inhibiting biofilm growth, copper ionization enhances the efficiency of water distribution systems and reduces the risk of microbial contamination.

## 5. Algae Control:

In swimming pools and other water bodies, copper ionization effectively controls algae growth. Copper ions disrupt the photosynthesis process in algae cells, leading to their inhibition. By eliminating the need for algaecides or excessive chlorination, copper ionization helps maintain crystal-clear water without the harsh chemical odors often associated with conventional treatments.

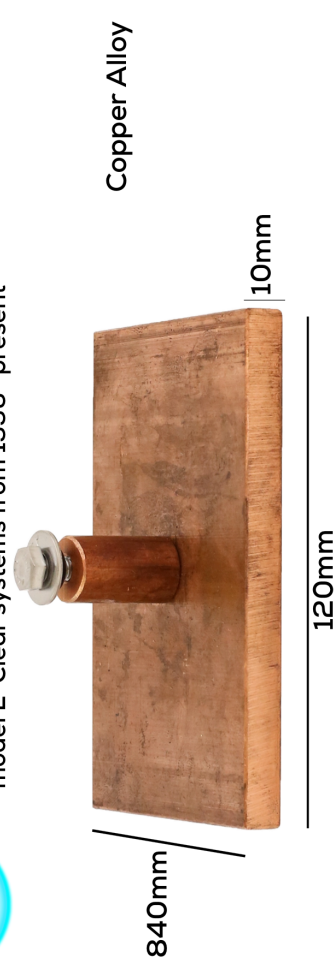
## 6. Stability and pH Tolerance:

E-Clear's Copper ionization system is stable and can tolerate a wide range of pH levels in water. This versatility ensures consistent performance even in varying water conditions, making it suitable for diverse applications, from residential pools to large-scale industrial water treatment.

Copper ionization in water treatment offers a host of benefits due to the antimicrobial properties of copper ions. It provides effective microbial control, long-lasting protection, and biofilm prevention, while reducing the reliance on chemical disinfectants. Additionally, copper ionization is an environmentally friendly solution that effectively controls algae growth and maintains water quality in swimming pools and other water bodies. Its stability and pH tolerance make it a versatile option for a wide range of water treatment applications. As the demand for sustainable and safe water treatment solutions grows, copper ionization continues to be a valuable technique in improving water quality and enhancing public health.

**90MM PURE COPPER ELECTRODE**

To fit all MK-150, MK-250, MK-500, MK-750 and MK-1000 model E-Clear systems from 1996 - present



Assembled in South Africa

WEIGHT: 800g



# SILVER IONIZATION



E-Clear's Silver ionization is a water treatment method that utilizes the antimicrobial properties of silver ions (Ag<sup>+</sup>) to provide various benefits in water disinfection and purification. This process involves the controlled release of silver ions into the water, where they interact with microorganisms to eliminate or inhibit their growth. Below is a comprehensive science explanation of the benefits of silver ionization in water treatment:



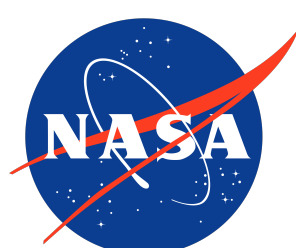
## 1. Broad-Spectrum Microbial Control:

Silver ions exhibit potent biocidal activity against a wide range of microorganisms, including bacteria, viruses, protozoa, and fungi. When silver ions come into contact with these microorganisms, they interfere with essential cellular processes and biomolecules, disrupting cell membranes, enzyme functions, and DNA replication. This disruption leads to the inactivation or death of the microorganisms, providing highly effective and broad-spectrum microbial control in water.



## 2. Long-Lasting Protection:

One of the significant advantages of silver ionization is its ability to provide long-lasting protection. Unlike some chemical disinfectants that quickly dissipate in water, silver ions remain active for extended periods. This sustained efficacy allows silver ionization systems to offer continuous water treatment, ensuring a consistent level of microbial control over time.



## 3. Reduced Chemical Usage:

Silver ionization reduces the reliance on chemical disinfectants, such as chlorine or bromine, for water treatment. While these chemicals can effectively kill microorganisms, they may produce harmful disinfection by-products (DBPs) when reacting with organic matter in the water. Silver ionization offers a more environmentally friendly alternative by minimizing the use of these chemicals and reducing the potential health risks associated with DBPs.

## 4. Biofilm Prevention and Control:

Biofilms are complex microbial communities that adhere to surfaces, forming a protective layer that makes them resistant to conventional disinfection methods. Silver ions help prevent biofilm formation and gradually break down existing biofilms. By inhibiting biofilm growth, silver ionization enhances the efficiency of water distribution systems, water storage tanks, and other water-contact surfaces, reducing the risk of microbial contamination.

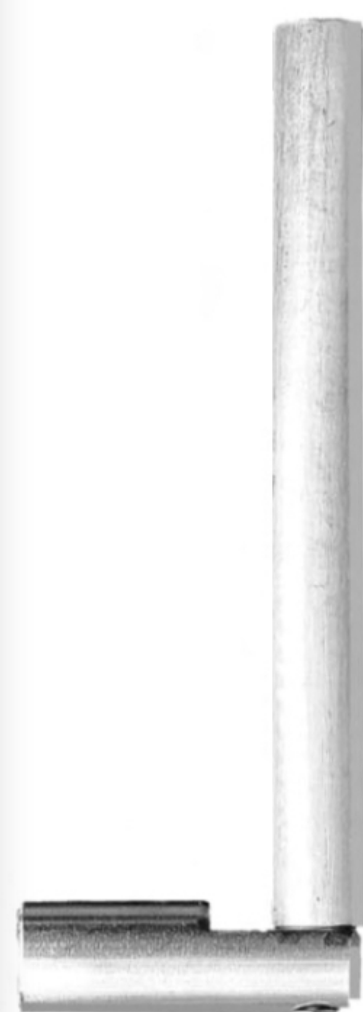
## 5. Algae Control:

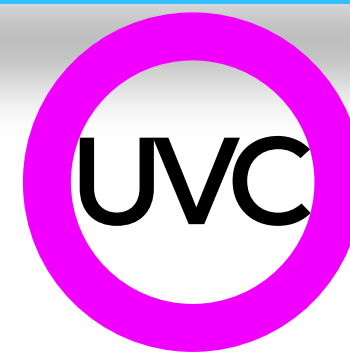
In various water bodies, such as swimming pools, decorative fountains, and cooling towers, silver ionization effectively controls algae growth. Silver ions disrupt the photosynthesis process in algae cells, leading to their inhibition. By eliminating the need for algacides or excessive chlorination, silver ionization helps maintain clear water without the strong chemical odors often associated with traditional treatments. When combined with E-Clear's Patented Oxygen Electrodes, provide a truly CHEMICAL FREE Solution to water treatment.

Silver ionization in water treatment offers a host of benefits due to the potent antimicrobial properties of silver ions. It provides broad-spectrum microbial control, long-lasting protection, and biofilm prevention and control, while reducing the reliance on chemical disinfectants. Additionally, silver ionization is an environmentally friendly solution that effectively controls algae growth and maintains water quality in various water bodies. As the demand for safe and sustainable water treatment solutions continues to grow, silver ionization remains a valuable technique in improving water quality and enhancing public health.

Silver Electrode  
To fit all E-Clear MKX models.

- M6 Threaded lug
- 99.99% Pure Silver
- 316 Stainless Steel Lug
- Weight 80g
- 37mm x 110mm x 10mm





# ULTRAVIOLET



E-Clear's Ultraviolet (UV) sanitization is a water treatment method that utilizes the germicidal properties of UV light to provide numerous benefits in water disinfection and purification. This process involves exposing water to UV light, which effectively inactivates or destroys various microorganisms present in the water. Only E-Clear Technologies UV Sanitizers are housed in 316L FOOD GRADE STAINLESS STEEL CHAMBERS! Below is a detailed science explanation of the benefits of ultraviolet sanitization in water treatment:

### 1. Effective Microbial Inactivation:

UV sanitization is highly effective in inactivating a wide range of microorganisms, including bacteria, viruses, protozoa, and algae. When water is exposed to UV light at specific wavelengths (typically between 200 and 300 nanometers), the energy from the UV photons is absorbed by the DNA and RNA of these microorganisms. This absorption leads to the formation of thymine dimers, which interfere with the microorganisms' ability to replicate and carry out vital cellular functions. As a result, the microorganisms are rendered unable to reproduce or cause infection, effectively disinfecting the water.

### 2. No Chemical By-Products:

Unlike chemical disinfection methods that can produce harmful disinfection by-products (DBPs), UV sanitization does not introduce any chemicals into the water. As a non-chemical process, UV treatment eliminates the risk of forming harmful DBPs like trihalomethanes, haloacetic acids, and chloramines, which can be associated with chlorine or chloramine disinfection. UV treatment is an environmentally friendly and safe alternative that ensures the water remains free from chemical contaminants.

### 3. Residual-Free Disinfection:

UV sanitization does not leave any residual disinfectants in the treated water. After exposure to UV light, the water remains free from any harmful microorganisms without any lingering taste or odor associated with chemical disinfectants. This characteristic makes UV sanitization ideal for drinking water, as it does not alter the water's taste or quality.

### 4. Efficiency Against Chlorine-Resistant Organisms:

Some microorganisms, such as chlorine-resistant pathogens and certain protozoa (e.g., Cryptosporidium and Giardia), can survive and remain infectious despite exposure to conventional chlorine disinfection. UV sanitization effectively addresses this limitation by providing an additional layer of disinfection. It serves as a reliable barrier against chlorine-resistant organisms, ensuring water safety and preventing potential waterborne disease outbreaks.

### 5. Rapid Disinfection Process:

UV sanitization provides rapid disinfection, making it suitable for various applications requiring on-demand water treatment. Unlike some chemical disinfectants that may require contact time or mixing, UV treatment instantly starts working when the water passes through the UV chamber. This feature allows for quick and continuous water disinfection without the need for prolonged waiting periods.

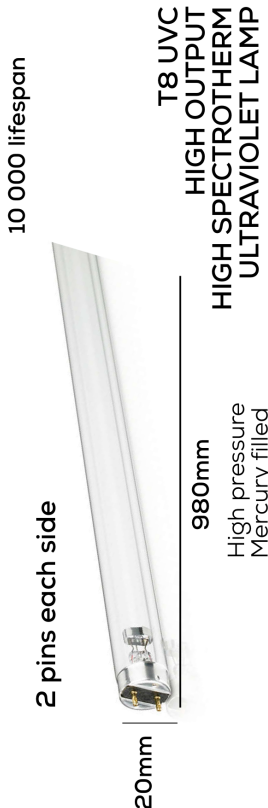
### 6. Low Maintenance and Operating Costs:

UV sanitization systems generally have low maintenance requirements and operating costs compared to some chemical disinfection methods. The lamps used in E-Clear UV systems have a predictable lifespan of 10 000 hours and routine maintenance mainly involves periodic lamp replacement. Additionally, UV systems require minimal energy to operate, making them a cost-effective and sustainable option for water treatment.

Ultraviolet sanitization offers an array of benefits in water treatment due to its effective microbial inactivation, absence of chemical by-products, residual-free disinfection, and efficiency against chlorine-resistant organisms. The rapid disinfection process, low maintenance, and operating costs make UV sanitization an ideal choice for various water treatment applications, including drinking water, swimming pools, wastewater treatment, and industrial processes. As the demand for safe and sustainable water treatment solutions continues to grow, UV sanitization remains a reliable and essential technique in ensuring the delivery of clean and healthy water for various uses.

55W ULTRAVIOLET LAMP

To fit all E-Clear systems from 1996- present



WEIGHT: 100g

Assembled in South Africa