



# Disinfection, Decontamination and Deodorization Solution

**biotek**ozone



## Product – History

### *Ozone – the Earth's most powerful and natural sanitizing agent!*

Biotek Ozone is the product of Biotek Environmental Science Ltd. (hereinafter called “BES”) which was established by a team of ozone engineers from Taiwan in 1988. Later on, BES established its company in the UK and teamed up with the professors in The University of Birmingham to develop electrolysis ozone generator.

BES is now the world's leading supplier of electrolytic ozone generators and integrated ozone systems in household, commercial, light industrial and medical applications. In the past 15 years, Biotek has obtained more than 40 patents in electrolytic ozone generator and its integrated ozone systems has also been approved by many international standard inspections and testings.

- 1988 – Biotek Environmental Science Ltd. was established and became the world's No. 1 small-size-ozone-generator manufacturer.
- 1989 – Corona Discharged Ozone Generator was manufactured and generated ozone at 100 mg/hr.
- 1992 – The world's smallest Corona Discharged Ozone Generator was launched and generated ozone at 250 mg/hr.
- 1995 – BES established its company in the UK and teamed up with the professors in The University of Birmingham to develop Electrolysis Ozone Generator.
- 1998 – Air-cool type Electrolysis Ozone Generator was developed and generated ozone up to 450 mg/hr.
- 1999 – The world's first most compact Electrolysis Ozone Generator was launched, with consecutive ozone generation reaching 500 mg/hr and generator life span over 2,000 hrs. (for higher than 75% optimal generation levels).  
  
In October 1999, Biotek started using the ultra-thin titanium alloy in making the ozone generator. The instant ozone generation reaches 500 mg/hr, and over 3,000 hrs. (for higher than 80% optimal generation levels).
- 2002 – Application, life span, durability and application integration of product was tested.
- 2004 – The technology development of Electrolysis Ozone Generation system completed.
- 2005 – BES's manufacturing plant in China was in operation and Biotek ozone generation products obtained more than 40 patents.
- 2006 – BES's manufacturing plant in China obtained ISO9001:2000 and ISO13485:2003 Management System.
- 2007 – Commercial grade Electrolysis Ozone Generator with 5,000 hrs' life span was manufactured.
- 2009 – High efficiency Electrolysis Ozone Generator with 9,000+ hrs' life span for use in light industries was manufactured.

## Product – Product Intro

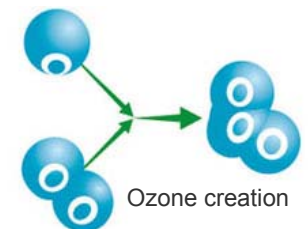
### *Biotek, Your Food Safety and Sanitation Partner*

In the fast-paced catering industry, keeping a high level of sanitation standard is a challenging task. Biotek ozone disinfection system guarantees that every aspect of your food safety and sanitation is protected, including hand washing, surface disinfection, produce washing, water sanitation and ice safety. In Europe, catering and beverage industries are legally required to use ozonated water for disinfection, decontamination and deodorization.

Food safety in the food service industry is very important whether it is for food preparation, processing or serving. Ozone is certainly an ideal solution for disinfection, decontamination and deodorization because it is the most natural and strongest agent in the world, which is approved by FDA for direct food contact.

### *What is Ozone?*

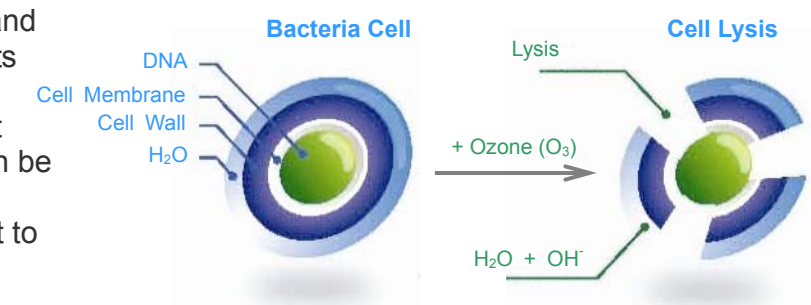
Ozone ( $O_3$ ), derived from the Greek word “Ozein”, meaning “fresh air”. It exists naturally on Earth. Lightning empowers oxygen in the air and transforms it into ozone, forming the ozone layer that cleanses the Earth's atmosphere, balancing the bacteria population and neutralizing harmful chemicals.



Ozone ( $O_3$ ) is an unstable and highly reactive form of oxygen due to its extra oxygen molecule with strong oxidizing and self-decomposing properties. Thus, ozone ( $O_3$ ) is the most powerful and effective disinfection, decontamination and deodorization agent in the world.

### *How Does Ozone Kill Bacteria?*

Ozone oxidizes bacteria cell wall and membrane causes lysis that inhibits and blocks the operation of its enzymatic control system so that it cannot recover, i.e. no cell wall can be built up again. After the oxidation process, ozone will naturally revert to its stable oxygen state, leaving no harmful by-products or residues.



Ozone ( $O_3$ ) is nature's best gift to us as the most powerful, effective and safest agent and has been used for disinfection since 1905 in many industries for eliminating pesticides, harmful chemicals, viruses and bacteria etc. Its effectiveness and sterilization speed are 50 and 3,000 times faster respectively than any other disinfection agents, like chlorine bleach!

BioteK Ozone Disinfection System

**Countertop/Wall Mount Model**

C-7120 / C-7120U



**Central Water Treatment Model**


CDS



**Mobile Model**

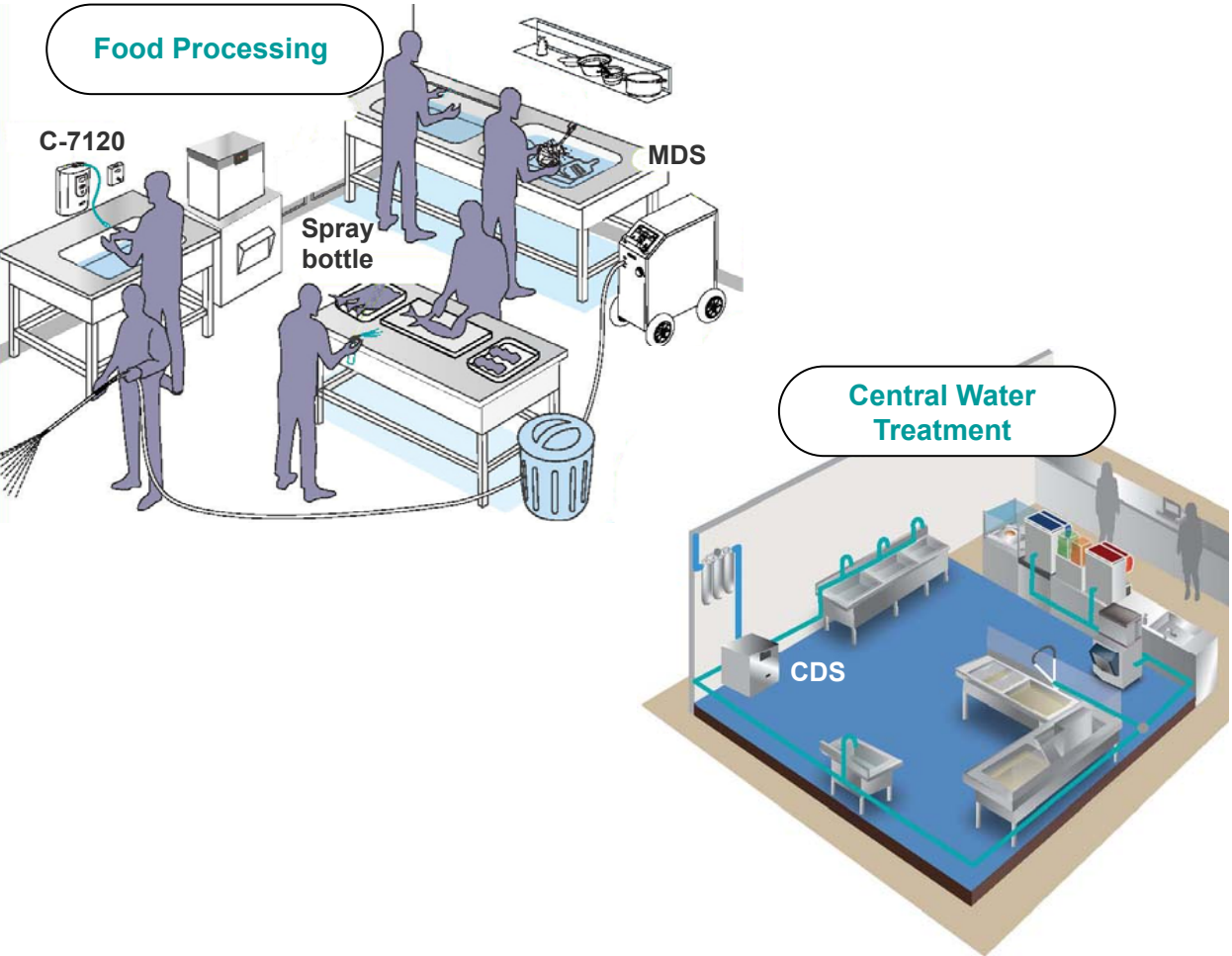
MDS





**Accessory - Spray Bottle**  
The aluminum ally spray bottle is designed for surface disinfection, e.g. kitchen worktop, food counter etc. Its inner layer was coated with epoxy resin, which is antioxidant material, and thus it can store 275 ml of high concentrated ozone water (2-4ppm) and can keep for approx. 20-40 mins.

Application of BioteK Ozone Disinfection System



BioteK Ozone Disinfection System Specifications

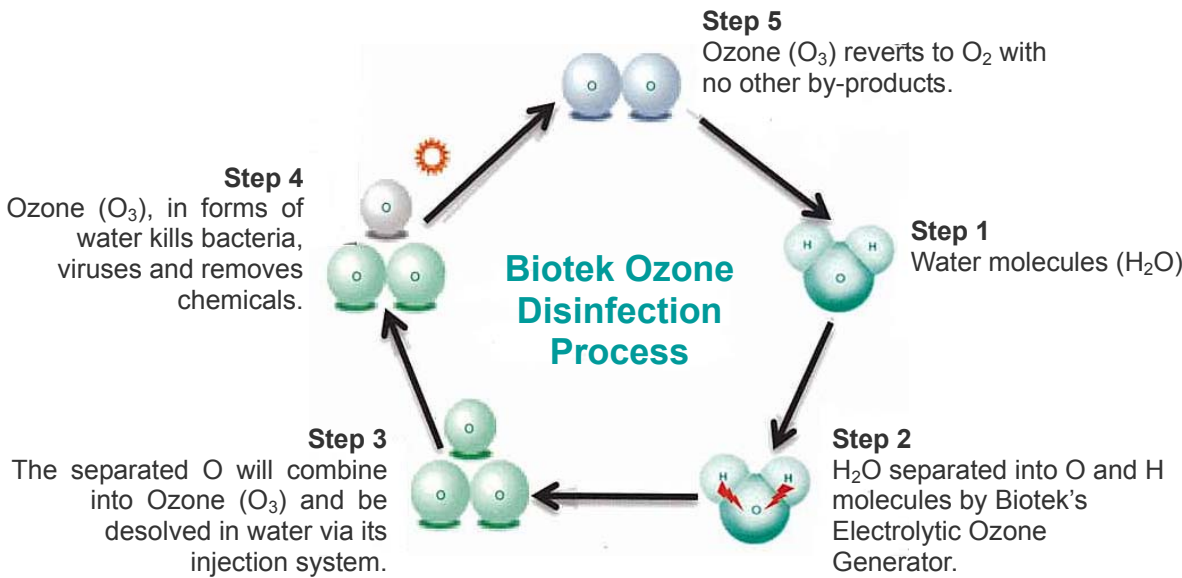
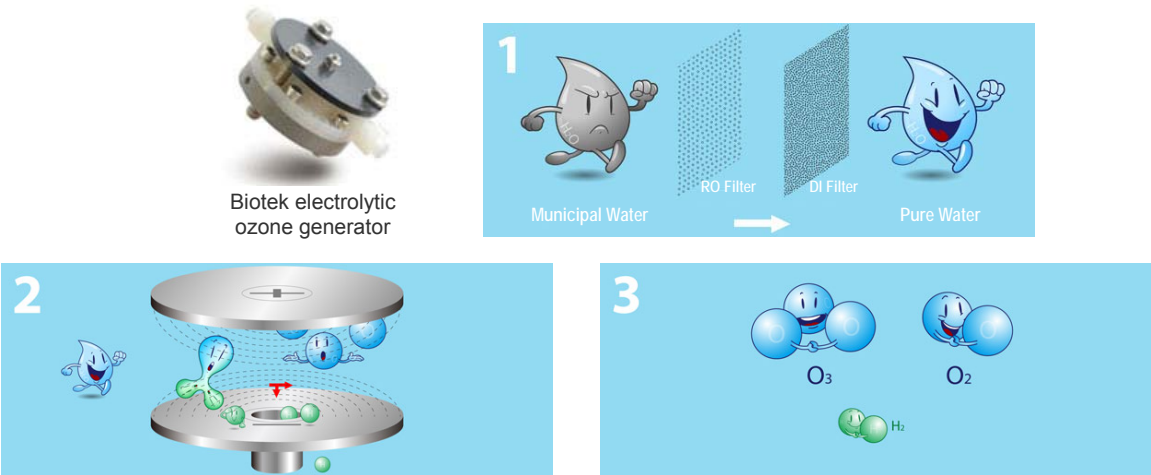
Model	C-7120	C-7120U	CDS	MDS
Type	Countertop	Under-sink	Floor	Mobile
Color	Dark grey		Stainless steel	Stainless steel
Flow rate	180±10% L/hr		100-3000 L/hr	400-3000 L/hr
O <sub>3</sub> concentration	4 ppm (0-20 sec.) 2 ppm (0-20 min.) 1 ppm (continuous)		0.2-6.0 ppm	0.5-6.0 ppm
Input Press	1.5-7.0 kg/cm <sup>2</sup>		2.0-4.0 kg/cm <sup>2</sup>	2.0-7.0 kg/cm <sup>2</sup>
Output Press	0.1-0.3 kg/cm <sup>2</sup>		≤3.0 kg/cm <sup>2</sup>	1.5-3.0 kg/cm <sup>2</sup>
Ozone generator life	3,000 hrs		6,000 hrs	6,000 hrs
Elect. loading	220V /50h / 1ph; 800W		220V /50h / 1ph; 800W	220V /50h / 1ph; 950W
Dimension	330 x 190 x 410 mm (H)		400 x 700 x 709 mm (H)	420 x 1000 x 900 mm (H)

ppm (parts per million) is used to measure concentration.  
1 ppm = 1 mg/liter, i.e. 1 milligram of dissolved ozone molecules in 1 liter of ozone water solution.



Biotech's Ozone Generation Technology

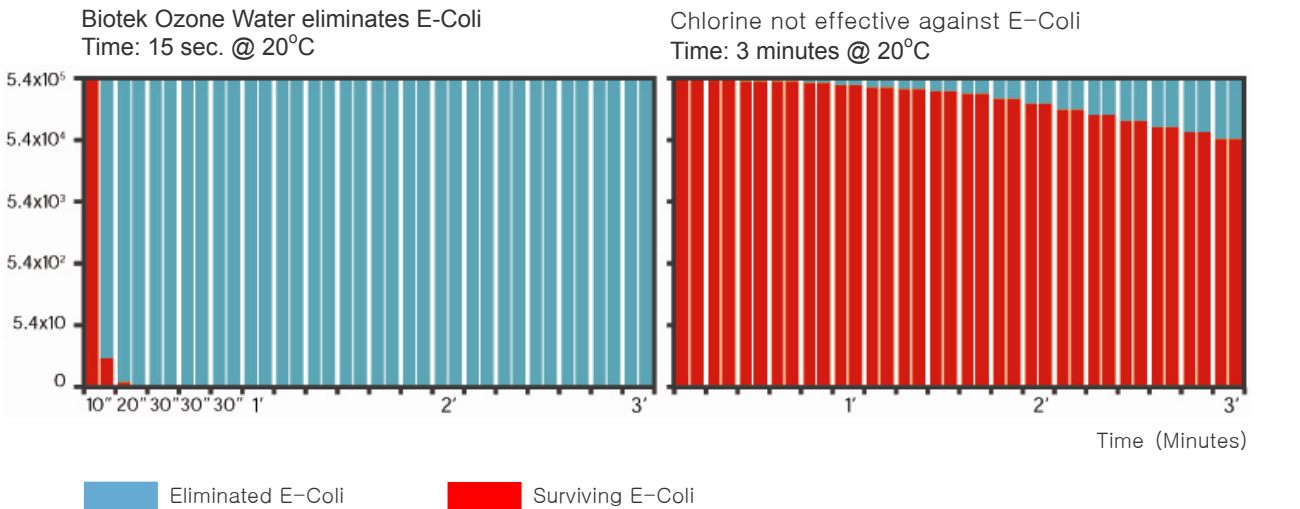
In the past 15 years, Biotech has developed its **Electrolytic Ozone Generator** and its integrated ozone system has obtained more than 40 patents. Its technology is to **create ozone from water into water** for application, i.e. using normal tap water, going through the Biotech's electrolytic ozone generator, **generating 20% to 30% ozone to be dissolved in water** via its injection system, thus providing instant high concentration ozonated water.



Test Reports on Effectiveness of Biotech Ozone Water

SGS	SGS Test Report of Biotech Ozone Water Disinfection (2.0 ppm O <sub>3</sub> )				
	Test Item	0 sec.	5 sec.	15 sec.	Reduction
Antimicrobial Effectiveness Testing	Staphylococcus aureus (CFU/ml)	5.4x10 <sup>5</sup>	Not detected	Not detected	>99.999%
	Escherichia coli (CFU/ml)	2.5x10 <sup>5</sup>	6.1x10	<10	99.99%
	Salmonella (CFU/ml)	1.7x10 <sup>5</sup>	1.9x10	Not detected	99.9%
	Pseudomonas aeruginosa (CFU/ml)	4.5x10 <sup>5</sup>	Not detected	Not detected	>99.999%
	Candida albicans (CFU/ml)	1.3x10 <sup>5</sup>	Not detected	Not detected	>99.999%
	MRSA (CFU/ml)	1.3x10 <sup>5</sup>	Not detected	Not detected	>99.999%
Decomposition of Residual Pesticide	Mevinphos	0.642	0.0000		100%
	Permethrin	0.559	0.0337		94%

Biotech Ozone Water vs. Chlorine – Difference Testing on Disinfection Effectiveness (Test conducted by SGS)



List of Micro-organisms Disinfected by Biotek Ozone Water

BACTERIA

Achromobacter butyric NCI-9404	Escherichia coli	Serratia marcescens
Aeromonas harveyi NC-2	Flavobacterium SP A-3	Shigella dysenteriae
Aeromonas salmonicida NC-1102	Leptospira canicola	Shigella flexneria
Bacillus anthracis	Listeria	Shigella paradysenteriae
Bacillus cereus	Micrococcus candidus	Spirillum rubrum
B. coagulans	Micrococcus caseolyticus KM-15	Staphylococcus albus
Bacillus globigii	Micrococcus spheraeroides	Staphylococcus aureus
Bacillus licheniformis	Mycobacterium leprae	Streptococcus 'C'
Bacillus megatherium sp.	Mycobacterium tuberculosis	Streptococcus faecalis
Bacillus paratyphosus	Neisseria catarrhalis	Streptococcus hemolyticus
B. prodigiosus	Phytomonas tumefaciens	Streptococcus lactis
Bacillus subtilis	Proteus vulgaris	Streptococcus salivarius
B. stearothermophilus	Pseudomonas aeruginosa	Vibrio alginolyticus & anguillarum
Clostridium tetoni	Salmonella choleraesuis	Vibrio cholerae
Cryptosporidium	Salmonella enteritidis	Vibrio comma
Coliphage	Salmonella typhimurium	Virrio ichthyodermis NC-407
Corynebacterium diphtheriae	Salmonella typhosa	V. parahaemolyticus
Eberthella typhosa	Salmonella paratyphi	
Endamoeba histolice	Saricna lutea	

VIRUS

Adenovirus (type 7a)	Encephalomyocarditis	Legionella pneumophila
Bacteriophage (E. coli)	Hepatitis A	Polio virus (Polimyelitus) 1, 2 & 3
Coxsackie A9, B3, & B5	HIV	Rotavirus
Cryptosporidium	GD V11 Virus	Tobacco mosaic
Coronavirus (SARS)	Onfectious hepatitis	
Echoviurs 1, 5, 12 & 29	Influenza	

FUNGUS & MOLD SPORES

Aspergillus candidus	Fusarium oxysporum	Penicillium digitatum (olive)
Aspergillus flavus (yellowish-green)	Grotrichum	Penicillium glaucum
Aspergillus glaucus (bluish-green)	Mucor recomosus A&B (white-gray)	Pennicillium expansum (olive)
Aspergillus niger (black)	Mucor piriformis	Penicillium egyptiacum
Aspergillus terreus, saitoi & oryzac	Oospora lactis (white)	Penicillium roqueforti (green)
Botrytis allii	Penicillium cyclopium	Rhizopus nigricans (black)
Colletotrichum lagenarium	P. chrysogenum & citrinum	Rhizopus stolonifer

Biotek Ozone Water vs Common Disinfection Methods

Application Comparisons					
	Biotek Ozone Water	Alcohol Gel	Liquid Chlorine	Chlorine Dioxide	Heat & Steam
Hand sanitation	✓	✓	✓	✓	✗
Produce wash	✓	✗	✓	✓	✗
Utensil disinfection	✓	✗	✓	✓	✓
Surface disinfection	✓	✗	✓	✓	✗
Deodorizing	✓	✗	✗	✗	✗
Pre-storage rinse	✓	✗	✗	✗	✗

Operation Comparisons					
	Biotek Ozone Water	Alcohol Gel	Liquid Chlorine	Chlorine Dioxide	Heat & Steam
Efficacy	highest	medium / low	medium	medium / high	medium / low
No chemical residues	✓	✗	✗	✗	✓
Initial cost	high	low	low	low	high
Running cost	low	medium	medium	medium	medium
Free from chemical storage	✓	✗	✗	✗	✓
Reliable efficacy	✓	✗	✗	✗	✗
Safe operation	✓	✗	✗	✗	✗
Simple use	✓	✓	✗	✗	✗
Fast effectiveness <10 mins.	✓	✗	✗	✗	✗
Energy/water expenditure	low	low	high water	high water	high

Effectiveness and Convenience Comparisons					
	Biotek Ozone Water	Alcohol Gel	Liquid Chlorine	Chlorine Dioxide	Heat & Steam
Effective on bacteria	✓	✓ *	✓ *	✓ *	✓
Effective on viruses	✓	✗	✗	✗	✗
Effective on pesticides	✓	✗	✗	✗	✗
Residual disinfection	✓ **	✓	✓	✓	✗
Compatible with all materials (including raw food materials)	✓	✗	✗	✗	✓
Extend shelf time	✓	✗	✗	✗	✓
Environmentally friendly	✓	✗	✗	✗	✓

\* Effective in lab controlled test but proven to be inconstant in practical applicaiton  
\*\* Ozone has a residence time of 20 mins. Biotek ozone water will provide disinfection more than 10 mins. after output.

## Certifications of Biotek

Biotek has engaged in research and development of electrolytic ozone generator technology for more than two decades and obtained more than 40 international patents, including 12 PCT patents. Its high purification performance has been approved by many international standard inspections and testings.



### NSF (National Sanitation Foundation)

NSF is committed to protect the public safety and environment. It is an independent, non-profit organization that develops standards and certifies products for the world's food, water and consumer goods. The standard of NSF is being recognized worldwide.

Biotek is the only ozone generator that has been approved in the official list of NSF169 – Special Purpose Food Equipment and Devices.



### HACCP Australia – Hazard Analysis and Critical Control Points

HACCP Australia is a leading food science organization specializing in the HACCP Food Safety Methodology and its applications within the food and related food industries.

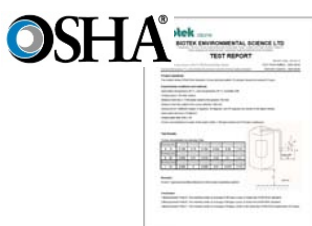
Biotek has been endorsed as “Food-Safe” sanitation for food processing facilities.



### SGS

SGS is the world's leading inspection, verification, testing and certification company and recognized as the global benchmark for quality and integrity.

Biotek has passed various tests conducted by SGS on its effectiveness of disinfection on different micro-organisms.



### OSHA – Occupational Safety and Health Administration

OSHA aims to assure safe and health working conditions by setting and enforcing standards and also providing training, outreach and education.

Biotek meets the U.S. OSHA's critical requirement for off-gas levels to be below 0.008 ppm/8 hr.



### FDA – Food and Drug Administration

FDA is responsible for protecting and promoting public health through the regulation and supervision of foods and drugs produced in the U.S. or imported from other countries.

Ozone is approved to be safe for use as an antimicrobial agent on food, including meat and poultry in 2001 by FDA.



### Ministry of Health of the P.R.C.

Biotek has been tested and proved that Biotek's ozonated water complied with the standard for the use in medical disinfection.



### The Academy of Military Medical Sciences (AMMS) of the P.R.C.

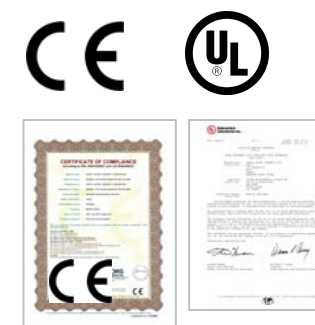
Biotek has passed various tests conducted by AMMS on its ozone concentration, effectiveness of disinfection on different micro-organisms etc.



### ISO – International Standard Organization

ISO develops and unifies worldwide industrial and commercial standards.

Biotek complied and obtained ISO9001:2000 Quality Management System and ISO13485:2003 Management systems standard specifically developed for the manufacture of medical devices.



### CE and UL

CE is the uniform standard and regulation developed by European countries for safe operation of electrical products produced in EU or imported from other countries.

UL is an independent product safety testing and certification organization in the U.S.

Biotek complies with the essential requirements of both CE and UL in relevant health, safety, environmental protection legislations.



## Applications

### *Application of Biotek Ozone Water*



#### **Hand Disinfection**

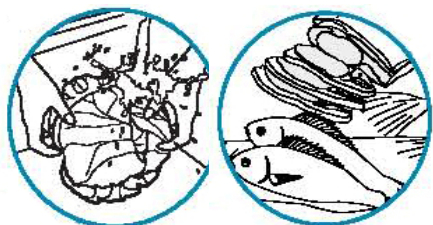
Our hands come into contact with many different objects everyday and can be easily contaminated with bacteria and viruses and must be thoroughly cleaned before any food processing or eating.

Prewash hands with soap and rinse hands under ozone water for at least 20 seconds, **microorganisms on hands can be reduced by 71.4%**.

#### **Floor / Utensil Surface Disinfection**

Some chemicals are commonly used for floors and utensil surfaces, but not only these chemicals are ineffective to some bacteria and viruses, they are also harmful to be human body and the environment themselves.

Performing floors and utensil surface disinfection with ozone water will **eliminate up to 99.9999% of microorganisms and chemicals**, ensuring a clean and safe environment.



#### **Food Disinfection and Preservation**

Food safety has always been the most important criteria among all precaution procedures. It mainly involves cleaning processing and preserving.

Cleaning and processing food with ozone water will not only **minimize contamination and reduce microorganisms up to 99.9999%, it will also prolong the shelf life of food by as much as 200%**.

#### **Ice Disinfection**

Whether for drink or storage, ice is also an issue that cannot be overlooked.

Making ice with ozone water, the ices are **not only safely for eating, but also safe from contamination of foods** for storage so as to keep the freshness and shelf life of foods.



## FAQ

#### **Q: Is it safe to use Biotek?**

A: It is absolutely safe. Biotek generates high concentrated ozonated water for eliminating pesticides, harmful chemicals, viruses and bacteria etc. It will naturally revert to oxygen, leaving no harmful by-products or residues. It is certified by OSHA in the USA, that the off-gas level of Biotek is below 0.008 ppm / 8 hrs.

#### **Q: Biotek generates highly concentrated ozonated water for applications. However, will it be harmful to humans?**

A: It has been tested and proved that there are no harmful effects on humans when applying 4 ppm ozonated water generated by Biotek onto human skin and fingers. Please refer to PSE Certification.

#### **Q: What kind of bacteria and viruses as can be killed by Biotek's ozonated water?**

A: Please view the list of micro-organisms that can be disinfected by Biotek's ozonated water.

#### **Q: Can the ozonated water generated by Biotek be drunk?**

A: Biotek is designed to be used for cleaning foods and tools, such as decomposing pesticides on fruits and veggies, sanitizing hands and kitchen wares before handling of foods, eliminating germs on seafood and meat for longer preservation. Therefore, it is not recommended for drinking.

#### **Q: There is a traditional generation method named "Corona Discharge". How is it different from Biotek's?**

A: The "Corona Discharge" method uses high voltage electrical discharges, giving energy to O<sub>2</sub> in the input air and to form ozone. However, the volume and concentration of ozone generated by this method will be affected by the quality, humidity and temperature of air. Also, only less than 0.5 ppm ozone can be dissolved in the water for applications and thus the effectiveness of disinfection is low. Moreover, there are the by-products of nitrogen oxides and dioxides (NO<sub>x</sub>) which are harmful to human.

Biotek's electrolytic ozone generation technology uses normal tap water, goes through Biotek's electrolytic ozone generator, generates ozone to be dissolved in water via its injection system and provides instant high concentration ozonated water. After the oxidation process, ozone will revert to oxygen, leaving no harmful by-products or residues.



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Tel: (852) 2881-8270 Email: [enquiry@tnc.com.hk](mailto:enquiry@tnc.com.hk)  
Website: [www.tnc.com.hk](http://www.tnc.com.hk)