

ELECTROLYZED WATER

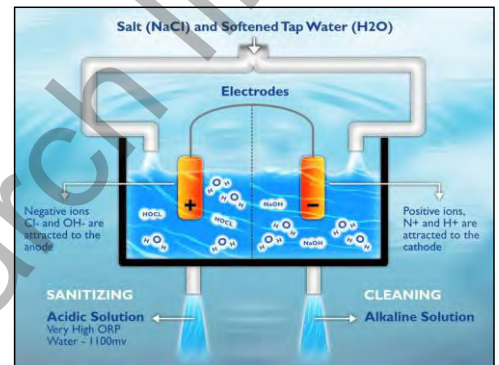
Hypochlorous Acid Disinfectant

Common Names:

1. NEW - Neutral Electrolyzed Water
2. EOW - Electrolyzed Oxidizing Water
3. ECA - Electro-Chemically Activated Water
4. SOW - Super-Oxidized Water
5. Anolyte

SAFE AROUND™

MARINE, PLANT, HUMAN AND ANIMAL LIFE



CONTACT KILL TIMES - HARD SURFACES

BACTERIA	*KILL TIME (min)	% INACTIVATION
<i>Aeromonas hydrophila</i>	1	99.99%
<i>Acinetobacter baumannii</i> ATCC 19606	1	99.99%
<i>Alicyclobacillus acidoterrestris</i> spores	5	99.99%
<i>Bacillus subtilis</i>	1	99.99%
<i>Campylobacter jejuni</i> ³	2	99~99.9%
Carbapenem-Resistant Enterbacter (CRE)	2	99.999%
Carbapenem-Resistant Kiebsioella Pneumoniae (CRKP)	2	99.999%
<i>Clostridium difficile</i> - spore (C. Diff or C difficile) (spores) (ATCC 43598)	10	99.99%
<i>Escherichia coli</i> ⁴	<0.5	99.99%
<i>E. coli</i> (entero-hemorrhagic) ⁴	<0.5	98.99~99.99%
<i>E. coli</i> ATCC 25922	1	99.99%
<i>Escherichia coli</i> O157:H7	<1	99.99%
<i>Escherichia coli</i> New Delhi Metallo-Beta Lactamase-1 (NDM-1)	<1	99.99%
<i>Enterobacter aerogenes</i>	<1	99.99%
<i>Enterococcus faecalis</i> ATCC 29212	1	99.99%
<i>Erwinia carotovora</i>	1	99.99%
<i>Klebsiella oxytoca</i>	<1	99.99%
<i>Klebsiella pneumoniae</i> ATCC 254988	1	99.99%
<i>Klebsiella pneumoniae</i> New Delhi Metallo-Beta Lactamase-1 (NDM-1)	<1	99.99%

BACTERIA	*KILL TIME (min)	% INACTIVATION
Klebsiella pneumoniae	1	99.99%
Klebsiella pneumoniae (multidrug-resistant)	<1	99.99%
Klebsiella oxytoca	<1	99.99%
Klebsiella pneumoniae ATCC 254988	1	99.99%
Listeria monocytogenes	1	99.99%
Listeria innocua	1	99.99%
Micrococcus Yunnanensis	2	99.99%
Mycobacterium tuberculosis (TB)	5~7	99.99%
Myroides spp.	1	99.99%
Pseudomonas aeruginosa ATCC 27853	1	99.99%
Pseudomonas Oryzihabitans	2	99.99%
Salmonella enterica	1	99.99%
Salmonella typhi ⁵	20	99.2%
Shigella dysenteriae ⁵	<1	99.9%
Shigella sonnei ⁶	1	99%
S.Typhimurium	10	99.99%
Staphylococcus aureus ATCC 29213	1	99.99%
Staphylococcus aureus (methicillin-resistant) (MRSA) (ATCC 33591)	1	99.99%
Stenotrophomonas maltophilia	<1	99.99%
Streptococcus pneumoniae (penicillin-resistant)	<1	99.99%
Streptococcus pyogenes	<1	99.99%
S.Typhimurium	10	99.99%
Vancomycin resistant Enterococcus faecium	1	99.99%
Vibrio cholerae (smooth strain) ⁷	<1	99.99%
Vibrio cholerae (rugose strain) ⁷	20	99.99%
Vibrio vulnificus	1	99.99%
V.parahaemolyticus	1	99.99%
Yersinia enterocolitica ⁸	>30	82~92%
VIRUS	*KILL TIME (min)	% INACTIVATION
Adenoviruses ¹¹	4.41	99.999%
Canine Distemper	<10	99.99%
Canine Parvovirus	<10	99.99%
Coxsackie A ⁹	0.3	99%
Coxsackie B ⁹	4.5	99%
Echovirus ⁹	1.8	99%
Hepatitis A ¹⁰	<1	99.99%
Hepatitis B (Surrogate for Human)	<2	99.99%
Hepatitis C (Bovine Viral Diarrhea)	<2	99.99%
Herpes Simplex	<10	99.99%
(HIV.1) · Human Immunodeficiency Virus TYPE.1	<2	99.99%
Human Coronavirus (HCoV) 229E	<2	99.999%
Influenza A H1N1	<10	99.99%
Influenza A H1N1 Pandemic	<10	99.96%
Influenza A H3N2	<10	99.99%

VIRUS	*KILL TIME (min)	% INACTIVATION
Influenza B	<10	99.99%
Influenza A H5N1	<10	99.99%
Norovirus (Feline Calicivirus - from cats)	0.07	99.99%
Norovirus (Murine - from rodents)	0.07	99.99%
Poliovirus ¹¹	12.72	99.99%
Rotavirus ¹²	0.25	99.99%
PROTOZOA	*KILL TIME (min)	% INACTIVATION
Entamoeba histolytica ¹³	10	99%
Cryptosporidium parvum ¹⁶	90	99.99%
Giardia intestinalis ¹⁴	10	99.99%
MOLD	*KILL TIME (min)	% INACTIVATION
A. Flavus	<1	99.99%
A. Fumigatus	<1	99.99%
A. Niger	<1	99.99%
YEAST	*KILL TIME (min)	% INACTIVATION
C. Albicans	<1	99.99%
C. Auris	<1	99.99%
C. Galbrata	<1	99.99%
C. Krusei	<1	99.99%
C. Lusitaniae	<1	99.99%
C. Parapsilosis	<1	99.99%
C. Tropicalis	<1	99.99%
Trichosporon ssp.	<1	99.99%
FUNGI	*KILL TIME (min)	% INACTIVATION
Alternaria Alternatga	10	99.99%
Aspergillus Brasillensis	10	99.99%
Botrytis cinerea	10	99.99%
Monilinia fruticola	10	99.99%

*500 ppm @ dilution rates 1:1~1:5

REFERENCES - 1

1. Lantagne D. Sodium hypochlorite dosage for household and emergency water treatment. JAWWA. 2008;Aug 100(8):106-19.
2. Howard K, Inglis TJ. The effect of free chlorine on Burkholderia pseudomallei in potable water. Water Res. 2003;37(18):4425-32.
3. Blaser MJ, Smith PF, et al. Inactivation of Campylobacter jejuni by chlorine and monochloramine. Appl Environ Microbiol. 1986;51(2):307-11.
4. Zhao T, Doyle MP, et al. Chlorine inactivation of Escherichia coli O157:H7 in water. J Food Prot. 2001;64(10):1607-9.
5. Butterfield CT, Wattie W, et al. Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to free chlorine. Public Health Rep. 1943;58(51):1837-1880.

REFERENCES - 1

6. King CH, Shotts EB, et al. Survival of coliforms and bacterial pathogens within protozoa during chlorination. *Appl Environ Microbiol.* 1988;54(12):3023-33.
7. Morris JG, Sztein MB, et al. *Vibrio cholerae* O1 can assume a chlorine-resistant rugose survival form that is virulent for humans. *J Infect Dis.* 1996;174(6):1364-8.
8. Paz ML, Duaigues MV, et al. Antimicrobial effect of chlorine on *Yersinia enterocolitica*. *J Appl Bacteriol.* 1993;75(3):220-5.
9. Engelbrecht RS, Weber MJ, et al. Comparative inactivation of viruses by chlorine. *Appl Environ Microbiol.* 1980;40(2):249-56.
10. Grabow WO, Gauss-Muller V, et al. Inactivation of hepatitis A virus and indicator organisms in water by free chlorine residuals. *Appl Environ Microbiol.* 1983;46(3):619- 24.
11. Thurston-Enriquez JA, Haas CN, et al. Chlorine inactivation of adenovirus type 40 and feline calicivirus. *Appl Environ Microbiol.* 2003;69(7):3979-85.
12. Vaughn JM, Chen YS, et al. Inactivation of human and simian rotaviruses by chlorine. *Appl Environ Microbiol.* 1986;51(2):391-4.
13. Stringer RP, Cramer WN, et al. Comparison of bromine, chlorine, and iodine as disinfectants for amoebic cysts, p. 193-209. In J. D. Johnson (ed.), *Disinfection: water and wastewater.* Ann Arbor Science Publishers, Inc. Ann Arbor, Mich.
14. Jarroll EL, Bingham AK, et al. Effect of chlorine on *Giardia lamblia* cyst viability. *Appl Environ Microbiol.* 1981;41(2):483-7.
15. Wainwright KE, Miller MA, et al. Chemical inactivation of *Toxoplasma gondii* oocysts in water. *J Parasitol.* 2007;93(4):925-31.
16. Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. *J Water Health.* 2008;6(4):513-20.

REFERENCES - 2

- [1] Senger SS, Arslan H.,Dirençli Kandida İnfeksiyonları Yeni ve Yeniden Gündeme Gelen İnfeksiyonlar, Ankara, Turkey, Bilimsel Tıp Yayınevi, 2009.
- [2] Tümbay E. Fırsatçı Mikozlar. Başustaoglu AC, Yıldırım ŞT, Tanyüksel M, Yapar M., Tıbbi Mikrobiyoloji 6. Baskı , Atlas Kitapçılık, Ankara, Turkey, 2010.
- [3] Çerikçioğlu N. Candida Türleri. Topçu AW, Söyletir G, Doğanay M. Editörler, Enfeksiyon Hastalıkları ve Mikrobiyolojisi, 3. Baskı, İstanbul, Turkey: Nobel Tıp Kitabevleri. 2411-2426, 2008.
- [4] Ener B. Hastane enfeksiyonu etkeni olarak mantarlar, Temel ve Klinik Mikrobiyoloji, Güneş Kitabevi, Ankara, Turkey,1999.
- [5] Akalın H.,Nozokomiyal Fungal Enfeksiyonlar, Enfeksiyon Hastalıkları ve Mikrobiyolojisi 3. Baskı, Nobel Tıp Kitabevleri, İstanbul, Turkey, 2008.
- [6] Beşirbellioğlu B. Enfeksiyon Kontrol Epidemiyolojisi ve Klinik Mikrobiyoloji, Klinik Mikrobiyoloji 9. Baskı, Atlas Kitapçılık, Ankara, Turkey,2009.
- [7] Pelczar MJ, Chan ECS, Krieg NR.,*Microbiology Concepts and Applications*, McGrawHill Publishing Company,1993.
- [8] Günaydın M., Dezenfeksiyon kontrolü: Dezenfektan solüsyonlar nasıl seçilmeli, nasıl denetim yapılmalı? , Hastane İnfeksiyonları Dergisi ,No.7, 189-194,2003
- [9] Perçin D, Esen Ş.,New Disinfectants and Problems in Practice. ANKEM, Vol.23,No.2, 89-93, 2009
- [10] Samastı M.,Hastanelerde Dezenfeksiyon Kullanım Esasları, Yapılan Hatalar, Sürekli Tıp Eğitimi Etkinlikleri. Hastane Enfeksiyonları Korunma Kontrol Sempozyumu, İ.Ü. Cerrahpaşa Tıp Fakültesi , 143-168,2008.
- [11] Kuştimur S, Yalınay Çırak M, Kalkancı A.,Çeşitli Candida türleri üzerine antiseptiklerin etkinliğinin zamana bağlı olarak incelenmesi, Mikrobiyoloji Bülteni, Vol.33, 339-346,1999
- [12] Nakipoğlu Y, Gürler B.,Çeşitli dezenfektan ve antiseptik maddelerin antibakteriyel etkinliğinin araştırılması. ANKEM, Vol.18,No. 4, 220-223,2004.
- [13] Forbes BA, Sahm DF, Weissfeld AS, Bailey & Scott's Diagnostic Microbiology 12th ed, Mosby Elsevier, USA,2007.

REFERENCES - 2

- [14] Bilgehan H., Klinik Mikrobiyolojik Tanı 4. Baskı, Barış Yayınları, İzmir, Turkey, 2004.
- [15] Alp S, Arıkan S., Investigation of extracellular elastase, acid proteinase and phospholipase activities as putative virulence factors in clinical isolates of *Aspergillus* species. *Journal of Basic Microbiology*, 48, 331-337, 2008.
- [16] Pfaller MA, Diekema DJ., Epidemiology of invasive candidiasis: a persistent public health problem, *Clinical Microbiology Review*, Vol.20, No.1, 133-63, 2007.
- [17] İrikli S, Tatman-Otkun M., Investigation of in vitro antimicrobial activities of some antiseptics and Disinfectants, *İnfeksiyon Dergisi*, 21, 1, 7-13, 2007.
- [18] Venkitanarayanan KS, Ezeike GO, Hung YC, Doyle MP., Efficacy of electrolyzed oxidizing water for inactivating *Escherichia coli* O157:H7, *Salmonella enteritidis*, and *Listeria monocytogenes*, *Applied and Environmental Microbiology*, Vol.65, No. 9, 4276-4279, 1999.
- [19] Landa SC. et al., A novel super-oxidized water with neutral pH and disinfectant activity." *Journal of Hospital Infection*, Vol.61, No.4, 291-299, 2005.
- [20] Deza MA, Araujo M, and Garrido MJ., Inactivation of *Escherichia coli*, *Listeria monocytogenes*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* on stainless steel and glass surfaces by neutral electrolyzed water, *Letters in applied microbiology*, Vol.40, No.5, 341-346, 2005.
- [21] Fenner DC, Bürge B, Kayser HP., The Antimicrobial Activity of Electrolysed Oxidizing Water against Microorganisms relevant in Veterinary Medicine, *Journal of Veterinary Medicine Series B*, Vol.53, No.3, 133-137, 2006.
- [22] Tanaka N, Fujisawa T, Daimon T, Fujiwara K, Yamamoto M, Abe T., The use of electrolyzed solutions for the cleaning and disinfecting of dialyzers, *Artif Organs*, Vol.24, No.12, 921-8, 2000.
- [24] Sakurai Y, Ogoshi K, Okubo T, Kaku M, & Kobayashi I., Strongly acidic electrolyzed water: Valuable disinfectant of endoscopes., *Digestive Endoscopy*, Vol.14, No.2, 61-66, 2002
- [24] Esen Ş., Disinfection and Disinfectant Choosing, *ANKEM*, Vol.26, No.2, 309-313, 2012
- [25] Wallace and Tiernan OSEC®, On-site Electrolytic Chlorination 2002,
- [26] www.siemens.co.uk/water [28] S.M.E. Rahman, Tian Ding, Deog-Hwan Oh. Effectiveness of low concentration electrolyzed water to inactivate foodborne pathogens under different environmental conditions.

REFERENCES - 3

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/1541-4337.12200>

<http://www.ijcem.com/files/ijcem0009922.pdf>

DISCLAIMER

The information provided above has been derived from sources as noted above, the internet and independent laboratory testing from various sources. The information provided is for general information purposes only. All information provided is done so in good faith, however we make no representation or warranty of any kind, expressed or implied, regarding the accuracy, adequacy, validity, reliability, availability, or completeness of an information that has been provided above. Under no circumstance shall we have any liability to any one for loss and or damage resulting from the information and or its use and the reliance of the information noted above is to use at one's own risk or validated by any user.