

# L'OZONO SU VIRUS, BATTERI, SPORE, FUNGHI E PROTOZOI

## Inattivazione di virus e batteri con Ozono

Organismo	% di riduzione	tempo (min.)	concentrazione (mg/l)	pH	temp. (°C)	mezzo	tipo reazione	commenti	referenze
<i>Escherichia Coli</i>	99,99	1,67	0,23 - 0,26	7	24	ozone demand free water	completely mixed continuous flow-through		Farooq and Akhlaque (1983)
<i>Legionella Pneumophila E221ADP</i>	99,997	20	0,32	7	24	sterile distilled water	Batch		Edelstein et al. (1982)
<i>Legionella Pneumophila E102A3DP</i>	99,999	20	0,32	7	24	sterile distilled water	Batch		Edelstein et al. (1982)
<i>Mycobacterium Fortuitum</i>	90	1,67	0,23 - 0,26	7	24	ozone demand free water	completely mixed continuous flow-through		Farooq and Akhlaque (1983)
<i>Salmonella Typhimurium</i>	99,995	1,87	0,23 - 0,26	7	24	ozone demand free water	completely mixed continuous flow-through		Farooq and Akhlaque (1983)
<i>Escherichia Coli</i>	99,9	19	init. 2,2 res. 0,08	7,5	18	raw wastewater	continuous flow-through	TSS 85 mg/l COD 100 mg/l	Joret et al. (1982)
<i>Fecal Streptococcus</i>	99,6	19	init. 2,2 res. 0,08	7,5	16	raw wastewater	continuous flow-through	TSS 85 mg/l COD 100 mg/l	Joret et al. (1982)
<i>Escherichia Coli</i>	99,998	0,16	0,51	7	20	water	continuous flow-through		Boyce et al. (1981)
<i>Escherichia Coli</i>	99	0,33	0,085	7,2	1	water	Batch		Katzenelson et al. (1974)
<i>Poliovirus Type 1 (Mahoney)</i>	99,7	1,67	0,23 - 0,26	7	24	ozone demand free water	completely mixed continuous flow-through		Farooq and Akhlaque (1983)
<i>Poliovirus Type 1 (Mahoney)</i>	90	0,75	0,32	4,3	N.R.	water	completely mixed continuous flow-through		Roy et al.
<i>Coxsackie-Virus B5</i>	99,99	2,6	0,4	7,2	20	activated sludge reactor effluent	Batch	TSS 12,5 mg/l NH3 1,55 mg/l BOD3 10,6 mg/l COD 37,2 mg/l	Harakeh and Butle (1985)
<i>Poliovirus Type 1</i>	99	20	0,2	7,2	20	activated sludge reactor effluent	Batch	TSS 12,5 mg/l NH3 1,55 mg/l BOD3 10,6 mg/l COD 37,2 mg/l	Harakeh and Butle (1985)
<i>Poliovirus Type 1</i>	99	0,25	0,5	7	24	N.R.	N.R.		Drinking Water and Health (1980)
Organismo	% di riduzione	tempo (min.)	concentrazione (mg/l)	pH	temp. (°C)	mezzo	tipo reazione	commenti	referenze
<i>Enteric Virus</i>	>98	19	init. 4,10 res. 0,08	7,8	18	raw wastewater	continuous flow-through	TSS 103 mg/l COD 231 mg/l	Joret et al. (1982)
<i>Echo Virus Type 1</i>	99	10	0,26	7,2	20	activated sludge effluent	Batch	TSS 12,5 mg/l NH3 1,55 mg/l BOD3 10,6 mg/l COD 37,2 mg/l	Harakeh and Butle (1985)
<i>Bacteriophage f2</i>	80	10	0,1	7,2	20	activated sludge effluent	Batch	TSS 12,5 mg/l NH3 1,55 mg/l BOD3 10,6 mg/l COD 37,2 mg/l	Harakeh and Butle (1985)
<i>Human Rotavirus</i>	80	10	0,31	7,2	20	activated sludge effluent	Batch	TSS 12,5 mg/l NH3 1,55 mg/l BOD3 10,6 mg/l COD 37,2 mg/l	Harakeh and Butle (1985)
<i>Poliovirus Type 1 Sabin</i>	>97	0,16	0,21	7	20	water	continuous flow-through	5TU.bentonite	Boyce et al.

Coxsackie A9	>96	0,16	0,035	7	20	water	continuous flow-through	5TU.bentonite	Boyce et al.
Bacteriophage f2	>99,995	0,1	0,41	7	20	water	continuous flow-through	5TU.bentonite	Boyce et al.

### Inattivazione di funghi e spore e fermenti

Organismo	% di riduzione	tempo (min.)	concentrazione (mg/l)	pH	temp. (°C)	mezzo	tipo reazione	commenti	referenze
<i>Candida Parapsilosis</i>	99,6	1,67	0,23 - 0,26	7	24	ozone demand free water	completely mixed continuous flow-through		Farooq and Akhlaque (1983)
<i>Candida Tropicalis</i>	99	0,30	0,02	7,2	20	ozone demand free water	completely mixed continuous flow-through		Kawamura et al. (1986)
<i>Pencilium Roqueforti</i>	99,6	0,45							
<i>Pencilium Expansum</i>	99,6	0,36							
<i>Pencilium Digitalum</i>	99,6	2,26							
<i>Aspergillus Glaucus</i>	99,6	2,26							
<i>Aspergillus Flavus</i>	99,6	2,45							
<i>Aspergillus Niger</i>	99,6	9,10							
<i>Rhizopus Nigricans</i>	99,6	6,06							
<i>Mucor Racemosus (A)</i>	99,6	0,58							
<i>Mucor Racemosus (B)</i>	99,6	0,58							
<i>Oospora Lactis</i>	99,6	0,18							
<i>Saccharomyces</i>	99,6	0,22							
<i>Saccharomyces Spores</i>	99,6	0,29							
<i>Saccharomyces Cerevisiae</i>	99,6	0,22							
Lievito di birra	99,6	0,11							
Lievito del pane	99,6	0,14							

### Inattivazione di protozoi con Ozono

Organismo	% di riduzione	tempo (min.)	concentrazione (mg/l)	pH	temp. (°C)	mezzo	tipo reazione	referenze
<i>Naeglaria gruberi</i>	99	7,8	0,55	7	6	water	Batch	4,23
	99	2,1	2	7	5	water	Batch	4,23
	99	4,3	0,3	7	25	water	Batch	1,29
	99	1,1	1,2	7	25	water	Batch	1,29
<i>Giardia muria</i>	99	12,9	0,13	7	5	water	Batch	1,94
	99	2,8	0,7	7	5	water	Batch	1,94
	99	9	0,03	7	25	water	Batch	0,27
	99	1,8	0,15	7	25	water	Batch	0,27
<i>Giardia lamblia</i>	99	5,3	0,1	7	5	water	Batch	0,53
	99	1,1	0,5	7	5	water	Batch	0,53
	99	5,5	0,03	7	25	water	Batch	0,17
	99	1,2	0,15	7	25	water	Batch	0,17

- 1: Farooq, S., Akhlaque, S., 1983. Comparative response of mixed cultures of bacteria and virus to ozonation. Water Res. 17,309.
- 2: Edelstein, P.H., Whittacker, R.E., Kreiling, R.I., and Howell, C.I. 1982. Efficacy of Ozone in eradication of Legionella Pneumophila from hospital plumbing fixtures. App. Environ Microbiol. , 44, 1330-1331.
- 3: Joret, J.C., Block, J.C., Hartemann and Richards, Y. 1982. Wastewater disinfection; Elimination of fecal bacteria and enteric viruses by Ozone. Ozone: Sci. Eng. 4, 91-99.
- 4: Harakeh, M.S., and Butler, M. 1983. Factors influencing the ozone inactivation.
- 5: Kawamura K. , Kanckom M., Hiratam T. and Taguchim K. 1986. Microbial indicators for the efficiency of disinfection processes. Water Sci. Technol. 18, 175-184.
- 6: Wiekramanayake, G.B. 1984. Kinetics and mechanism of Ozone Inactivation of Protozoan Cysts. Ph. Dissertation. Dept. Of Civil Engineering. The Ohio State University. Columbus, OH - USA.
- 7: Rubin, A.J., Engel, R.P. and Sproul, O.J., 1983. Disinfection of amoebic cysts in water with free chlorine. J. Water Poll. Cont. Fed., 55, 1174-1182.