Ozone Contactor CT and Log Inactivation

CT of a multi-compartment ozone contactor from first-order ozone decay and t10/t, and the log inactivation from the coefficient of specific lethality.

Input parameters

Unit system: SI

Parameter	Value	Unit
Ozone residual leaving the first compartment	1.0000	mg/L
Ozone decay rate	0.20000	1/min
Detention time of each compartment	4.0000	min
Reaction compartments after the first	3.0000	
Baffling factor t10/t	50.000	%
Coefficient of specific lethality (base 10, L/(mg·min))	1.6000	

Calculated results

Parameter	Value	Unit
CT of the reaction compartments	1.4839	
Log inactivation	2.3742	
Residual leaving the last compartment	0.090718	mg/L

Notes for this case

• CT in mg·min/L uses each compartment's outlet residual times its t10. The first compartment meets the immediate ozone demand and is left out. The specific lethality for Cryptosporidium is 0.256 L/mg·min (base 10) at 20 °C; it falls sharply in colder water.

Formula and method

$$C_i = C_1 e^{-k\,t_c\,i}, \quad CT = \sum_{i=1}^{n} C_i\,t_c\,\frac{t_{10}}{t}, \quad \log\frac{N_o}{N} = \Lambda \cdot CT$$

Variables

C_1	Ozone residual leaving the first compartment	kg/m³
k	Ozone decay rate	1/s
t_c	Detention time of each compartment	s
n	Reaction compartments after the first	-
t_{10}/t	Baffling factor t10/t	-
Λ	Coefficient of specific lethality (base 10, L/(mg·min))	-
CT	CT of the reaction compartments	-
$\log(N_o/N)$	Log inactivation	-
C_n	Residual leaving the last compartment	kg/m³

Method and standards

Ozone CT by compartments with first-order decay.

Assumptions and limits

- First-order ozone decay; Chick-Watson inactivation.

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/wastewater/ozone-contactor-ct

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.