Importance Of Log Reduction

Log Reduction	Reduction Factor	Percentage of bacteria Reduced	Bacteria Present	Number of bacteria killed	Bacteria left on surfaces After disinfection	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split	Number of bacteria present on the surface after cells split
						1	2	3	4	5	6	7	8	9	10
1	10	**90%**	1,000,000.00	900,000.00	100,000.00	200,000.00	400,000.00	800,000.00	1,600,000.00	3,200,000.00	6,400,000.00	12,800,000.00	25,600,000.00	51,200,000.00	102,400,000.00
2	100	**99%**	1,000,000.00	990,000.00	10,000.00	20,000.00	40,000.00	80,000.00	160,000.00	320,000.00	640,000.00	1,280,000.00	2,560,000.00	5,120,000.00	10,240,000.00
3	1,000	**99.9%**	1,000,000.00	999,000.00	1,000.00	2,000.00	4,000.00	8,000.00	16,000.00	32,000.00	64,000.00	128,000.00	256,000.00	512,000.00	1,024,000.00
4	10,000	**99.99%**	1,000,000.00	999,900.00	100.00	200.00	400.00	800.00	1,600.00	3,200.00	6,400.00	12,800.00	25,600.00	51,200.00	102,400.00
5	100,000	**99.999%**	1,000,000.00	999,990.00	10.00	20.00	40.00	80.00	160.00	320.00	640.00	1,280.00	2,560.00	5,120.00	10,240.00
6	1,000,000	**99.9999%**	1,000,000.00	999,999.00	1.00	2.00	4.00	8.00	16.00	32.00	64.00	128.00	256.00	512.00	1,024.00

Log Reduction Explanation

When designing disinfection systems, one of the core starting requirements is selecting the targeted reduction level of a specific microbe or, more specifically, reduction of colony forming units (CFU) of the targeted microbe.

Colony Forming Unit: For practical purposes, it would be too time consuming, complex and expensive to use a microscope and count every individual microbial cell of a sample. Instead, by diluting a sample and spreading this across a petri plate, microbiologists can count groups of microbes, called colonies. Each colony is assumed to have grown from a single CFU.

Similarly, when calculating and reporting the changes in CFUs after disinfection, rather than state the magnitude of change in individual CFUs, microbiologists express the performance as a percentage reduction in terms of a reduction factor and, for convenience, typically in factors of 10 using a logarithmic (log) reduction scale – a log reduction factor (LRV).

Log reduction is a mathematical term that is used to express the relative number of living microbes that are eliminated by disinfection.

Log reduction = log10 (N0 /N)

Where:

N0 = colony forming units of the microorganisms before exposure to UV light

N = colony forming units of the microorganisms after exposure to UV light

For example, a 1 log reduction corresponds to inactivating 90 percent of a target microbe with the microbe count being reduced by a factor of 10. Thus, a 2 log reduction will see a 99 percent reduction, or microbe reduction by a factor of 100, and so on. Table 1 (below) shows the chart of log reduction.

Log Reduction Reduction Factor Percent Reduced

1 10 90%

2 100 99%

3 1,000 99.9%

4 10,000 99.99%

5 100,000 99.999%

6 1,000,000 99.9999%

Effective disinfection systems achieve the desired log reduction factor by ensuring that the process delivers a microbe-specific UVC dose.