Log Reduction Value
A Measurement of Retention Efficiency

There are three common measurements of retention efficiency, Percent Efficiency, Beta Ratio and Log Reduction Value (LRV). This session of One Minute Filtration will focus on Log Reduction Value.

Log Reduction Value is a ration of the log to the base 10 of the challenge concentration divided by the filtrate concentration. It is most often used when there is a high concentration of a single challenge material, such as bacteria or latex beads. In the Pharmaceutical Industry the definition of a Sterilizing Grade Filter is one in which has a LRV of 7 and a sterile filtrate when challenged in accordance with the HIMA (Health Industry Manufacturing Association) test protocol.

$$LRV = Log_{10}\ Challenge/Filtrate$$

In the case of the Sterilizing Grade Filter, it is challenged with 10^7 bacteria of a prescribed type (Brevundimonas diminuta ATCC19146) per square centimeter and there is zero in the filtrate. Since it is not appropriate to divide by zero (0), a 1 is substituted and the terminology of "sterile filtrate" is added.

$$LRV = Log_{10}10^7/1 = Log_{10}10^7 = >7/cm^2\ and\ a\ sterile\ filtrate$$

Another example commonly used for measuring the efficiency of filters in the Microelectronics industry is a challenge of a particular size latex bead. In this case a filter might be challenged with 10^6 0.05 μm latex beads with 10^2 in the filtrate. In this case the LRV would be 4 per filter.

$$LRV = Log_{10}10^6/10^2 = Log_{10}10^4 = 4/Filter$$

Keywords
Filtration Media
Filtration and Filtration Processes
Efficiency