

D-value

The D-value is defined as the time at a particular temperature required to reduce a known number of microorganisms by 90% or to result in a 1-log reduction.

Z-value

The z-value, indicative of the change in the death rate based on temperature, is the number of degrees between a 10-fold change (1 log cycle) in an organism's heat resistance. In other words, it is the change in process temperature required to change the D-value by a factor of 10.

For example, if the z-value was 18 and $D_{240^{\circ}\text{F}} = 3$ minutes, then $D_{222^{\circ}\text{F}} (240-18) = 30$ minutes (a 10-fold change) and $D_{258^{\circ}\text{F}} (240+18) = .3$ minutes (a 10-fold change). To achieve a 5 log reduction in the target microorganism population it would take 150 minutes (5 X 30 minutes) at 222°F, 15 minutes at 240°F, and 1.5 minutes at 258°F.