ABSTRACT

Chandrasekar V, Ramaswamy R, Lalpuria M, Knabel S, Anantheswaran R. Modeling the diffusion of nisin through agar gels for predicting nisin activity. Institute of Food Technologists (IFT), July 2013, Chicago, IL.

A finite element computational model was developed to predict the size of the inhibition zone radius in an agar diffusion bioassay that quantifies the biological activity of nisin. Fick's second law of diffusion was used to predict nisin concentration profiles as a function of time and position within the agar for a two-temperature agar diffusion bioassay. The minimum inhibitory concentration (MIC) of nisin against Micrococcus luteus was determined experimentally. The critical time (Tc) for growth of M. luteus was experimentally determined using pre-incubation studies with nisin. The edge of the inhibition zone was calculated from the computational model as the location where the predicted nisin concentration at Tc was equal to MIC. The MIC was experimentally determined to be 0.156 μg ml-1, and Tc was determined to be 7 hours. Good agreement (R2 = 0.984) was obtained between model predicted and experimentally determined nisin activities.