

INACTIVATION KINETICS OF *ESCHERICHIA COLI* AND *STAPHYLOCOCCUS AUREUS* BY A HYDROGEN PEROXIDE BASED DISINFECTANT

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Abstract

Pathogenic bacteria in food industries may have several origins, including raw materials, workers, equipment and containers. If these bacteria are not destroyed during processing, they can grow during production, thus reducing the quality and safety of food. Hydrogen peroxide possesses many advantages comparing to other disinfectants. One of them is that it does not produce toxic residues. The aim of this study was to evaluate the efficiency of a hydrogen peroxide based disinfectant against *Escherichia coli* and *Staphylococcus aureus*, to reveal the nature of the inactivation kinetics and to determine the decimal reduction time (D-value) for mentioned bacteria.

Quantitative suspension test method was designed for the evaluation of bactericidal activity of mentioned disinfecting agent. The requirement of this standard is a minimum 5 log₁₀ reduction within 5 min. The contact times were 0, 1, 2, 3, 4, 5 minutes. The D-value experiments were done by inoculating 8 mL of disinfecting solution with 1 mL of a bacterial suspension. At regular intervals (every 1min.), 1 mL aliquots of this mixture were transferred to 8 mL of growth media containing a neutralizing agent, and incubated at 37 °C. Modeling of survival curves was carried out by using the first order log-linear regression model $\log \left[\frac{N_t}{N_0} \right] = -t/D$. The D-value was determined from the negative reciprocal of the slopes of the regression lines, using the linear portions of the survivor curves (log¹⁰ CFU/mL versus time of exposure to the disinfectant solution).

After 5 min. of contact time hydrogen peroxide possessed better inhibition activity (more than 6 log¹⁰ reduction) against *S. aureus* comparing with inhibition activity against *E. coli* (more than 5 log¹⁰ reduction) ($P < 0.05$). Linear death kinetics was observed during 5 min. contact frame. D-values for 2% solution of hydrogen peroxide based disinfectant at 20 °C were *E. coli* (D = 0.89 min.) and *S. aureus* (D = 0.81 min.).

The results of this study have shown that log-linear inactivation models could be applied to suspension test for modeling of efficiency of disinfecting agents during particular contact time frame.

Key words: Inactivation kinetics, Modelling, D-value, Hydrogen peroxide, Disinfectant, Suspension test, Foodborne pathogens.