

Abstract

Due to which kind of microorganisms that used to cause foodborne disease and inactivated microbial of microwave exposure in composition of foods, this research aimed to study the effects of time, power of microwave and composition of foods (pH, salt and fat) on the bactericidal activities. Three strains of bacteria *Escherichia coli*, *Bacillus cereus*, and *Staphylococcus aureus* were investigated in this experiment. The suspension containing 10^8 CFU mL^{-1} of each strain was exposed in microwave at different treatment times (1, 2, 3 and 5 min) and powers (50, 75 and 100%). Simultaneously, effects of different pH (4.3, 7.0 and 8.5), salt concentrations (1, 2 and 3%) and presented of fat (skim milk and full fat milk) were investigated.

For pH, either high or low pH, which was out of the optimal range for growth, increased the destruction efficiency of microwave heating when low power was used. At full power of microwave, the microorganisms were totally destroyed, especially at longer exposure time. *B. cereus* showed the highest resistant to the microwave heating, with the D-value of 0.8, 0.7 and 0.4 min for 50, 75 and 100% microwave power operating at pH 7, respectively. The presence of salt had also influence on the survival of microorganisms when they were exposed to the microwave heating at different heating powers and times. Increasing of salt concentration led to increase destruction effect. *E. coli* was the most sensitive bacteria to the microwave heating, while the spore forming bacteria *B. cereus* resisted to the microwave heating. Longer heating time or increasing in microwave power was required for complete destruction of *B. cereus* in the presence of salt. The presence of fat in food system provided the protective effect to the microorganisms subjected to microwave heating, especially spore forming bacteria like *B. cereus* that required longer time of microwave heating to destroy this organism.