Heat Transfer in Canned Liquid/Particle Mixtures Subjected to Free Axial Agitation Thermal Processing

M. Dwivedi, H. Ramaswamy

CSBE08202

Modeling of the heat sterilization of canned food in continuous rotary sterilizers requires data on two key parameters: the overall heat transfer coefficient (U) between the external heating medium and the internal rotating liquid, and the fluid to particle heat transfer coefficients h_{fp} between the rotating liquid and particles. Evaluation of the heat transfer coefficients (U and h_{fp}) associated with canned liquid particle mixtures in axial motion is challenging because of the difficulties involved in attaching the temperature measuring devices to the liquid and particles. Usually, the temperature should be measured without affecting the normal motion of the mixture in the can. For the proper design and successful optimization of the rotational retort process, a valid methodology to predict particle lethality during processing is vital. Extensive research has been carried out on the heat transfer associated particulate fluids under conditions involving end over end agitation, however very little is know about them under axial agitation under thermal processing conditions. This presentation will highlight development of a new methodology for the evaluation of both U and h_{fp} associated particulate fluids under axial agitation, evaluation of factors which influence these heat transfer parameters and finally modeling considerations including conventional statistical/response surface relationships, dimensionless correlations, and artificial neural network models.