CHAPTER I

INTRODUCTION

Thermal methods are extensively used for preservation of foods. Conventional thermal treatments lead to some undesirable changes especially in food with high viscosity or containing solids. Ohmic heating is a thermal process operation in which heat is internally generated within foods by the passage of alternating electric current from an electromagnetic source. The process enables solid particles to be heated as fast as liquids, thus making it possible to use High Temperature Short Time sterilization techniques on particulate foods. The major advantage claimed for ohmic heating is its ability to heat material rapidly and uniformly. The direct energy transfer is another advantage, as it gives high energy utilization. In a conventional heating, the thermal conductivity of a particle controls the heating rate, whereas in an ohmic heating process, the electrical conductivities of both solid and liquid are the controlling factors. A number of attempts have been made to use the advantages of the ohmic heating in food processing. To ensure sterilization, the heating behavior of the food must be known and this requires knowledge of the electrical conductivity as well as thermal property of food material. Since most previous works on electrical conductivity are limited to pasteurization temperature range, therefore this work will emphasize in the sterilization temperature range.

The objective of this study is to investigate factors affecting electrical conductivity and heating behavior of model food system with the aim to develop empirical models for electrical conductivity and heating rate during ohmic heating in sterilization temperature range.

Scope of the study

1. To investigate factors affecting the electrical conductivities of solid and model liquid food systems from 25-125 °C and develop empirical equation of electrical conductivity as function of temperature and significant factors.
2. To determine the effective electrical conductivity of solid-liquid food mixtures at different solid-liquid ratio and develop mathematical model for electrical conductivity of the food mixture based on the circuit analogy concept.

3. To determine the temperature distribution of solid-liquid food mixtures and develop mathematical model for temperature prediction of the slowest heating phase.

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