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THERMO-PHYSICAL AND TEXTURAL PROPERTIES OF MEAT AND CARROT ALGINATE PARTICLES FABRICATED FOR BIOLOGICAL VALIDATION STUDIES

HUSSEIN F. HASSAN[1], HOSAHALLI S. RAMASWAMY[1]

[1] H.F. HASSAN, Department of Food Science and Agricultural Chemistry, McGill University, Ste Anne de Bellevue, QC, Canada, hussein.hassan@mail.mcgill.ca.
[1] H.S. RAMASWAMY, hosahalli. ramaswamy@mcgill.ca.

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ABSTRACT Aseptic processing & continuous rotary autoclaving of particulate foods are facing challenges for process establishment since conventional temperature gathering techniques cannot be used for these products. A potential alternative is the biological validation concept where bacterial spores are dispensed in firm and thermally stable food simulated particles. Simulated particles can be prepared by adding sodium alginate to the material base & then dispensing the microbial spore culture into the puree, molding the puree to the desired shape & allowing the particle to shape in a solution of sterile calcium chloride. The objective of the study was to investigate the thermophysical and textural properties of meat and carrot alginate fabricated particles as influenced by the process variables. A response surface methodology (RSM) was used to study the effect of sodium alginate concentration (1.5-6.5%), calcium chloride concentration (1.0-3.0%) & dipping time (4-44 h) on the thermophysical and textural properties of the fabricated particles. The results showed that increasing sodium alginate concentration and dipping time significantly ($p<0.05$) increased the hardness and decreased the adhesiveness values. Increasing sodium alginate concentration resulted in a significant ($p<0.05$) decrease in the heat capacity, thermal conductivity and thermal diffusivity values. Optimal conditions for fabricating food simulated particles that are thermally stable and have similar thermophysical properties to the real foods were 5.5% sodium alginate, 2.4% calcium chloride and 33.8 h immersion time for the carrot/alginate vs. 4.9% sodium alginate, 1.7% calcium chloride and 36 h immersion time for the meat/alginate reconstituted particles. These data are of potential value to fabricate food/alginate particles for the biological validation studies.

Keywords: Biological validation, Alginate, Thermophysical, Textural.