

Prediction of temperature distribution in a horizontal high pressure food processing vessel and its impact on process uniformity

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ABSTRACT

The temperature distributions in high pressure processing (HPP) vessels are of particular concern for pressure assisted thermal sterilization (PATS) process in which the microbial inactivation occurs by primarily temperature and not by pressure. Numerical simulation was carried out to predict thermal transport in a horizontal HPP vessel with and without insulation. The results showed that the temperature of water added to compensate for compression of water in vessel and addition of insulation on the inner surface of vessel had significant impact on the temperature distribution and on the inactivation of *Clostridium botulinum* spores. It was concluded that adding insulation to the vessel lead to higher temperature levels but more non-uniform temperature distribution as compared to without insulation. It was also observed that the temperature distribution was most uniform when the temperature of the inlet water was same as the initial temperature for the process.

Keywords: high pressure processing, numerical modeling, pressure assisted thermal pasteurization, pressure assisted thermal sterilization, inactivation of spores