

# Performance improvement of a PCM cold box by two bilayers Configuration

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A method to increase the storage time of a PCM cold box to transport frozen materials maintained at a sub-zero temperature has been investigated in this paper. The configuration of a single Phase Change Material (PCM) pack surrounding the payload and subsequently surrounded by an insulation layer is termed as a bilayer configuration and is a traditional design of such cold boxes. Our study shows that by changing the configuration into two bilayers arranged in an onion type geometry, a significant advantage may be gained in terms of the total time for which the payload stays frozen. Such a simple modification to the container decreases the overall effective thermal diffusivity of the box for a fixed amount of PCM and insulation mass. The optimum distribution of the PCM and insulation material in a two bilayer configuration is studied using a simplified mathematical model.