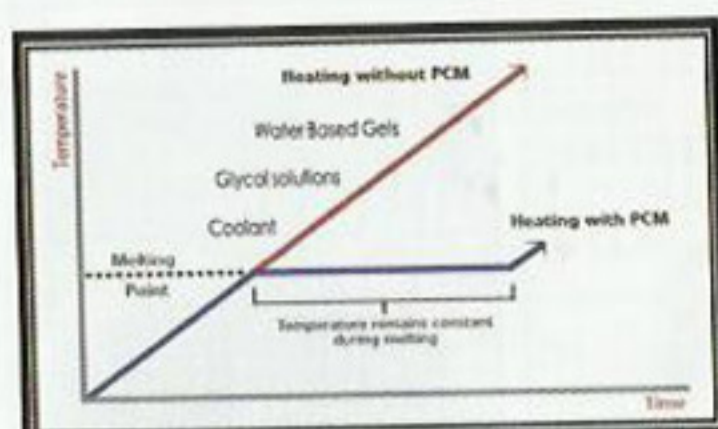


savE® Advanced Phase Change Materials (PCM) technology for protecting ice-creams in power deficit regions



It is a known fact that ice-cream requires the most fool proof cold chain management compared to any other product. Once melted it is impossible to regain the taste, texture and quality. Hence, it makes a lot of difference in the way in which ice-creams are produced, shipped and stored. Out of the estimated 4000 Crore ice-cream market, the majority of the sale comes from tier 1 cities as companies find it difficult to reach the rural areas due to lack of infrastructure and unavailability of power. This article introduces phase change materials, an innovative technology which addresses this challenge thereby increasing the opportunity to make ice-creams accessible at the best quality to the rural segment.

Phase Change Materials (PCM)

Phase Change Materials (PCM) fall under the sub category of energy exchanging smart materials. Energy exchanging smart materials is defined as those materials that are able to store latent and sensible energy in the form of light, heat, electricity or hydrogen and exhibit reversibility. A PCM has the ability to store and release large amounts of heat/energy while maintaining a constant temperature unlike conventional solutions as shown in the figure 1 below. PCM's have tremendous potential to fulfill the growing need of energy for cooling and heating applications across various industries. It finds its application globally in diverse sectors

like cold chain, HVAC, refrigeration, automobile air-conditioning, apparels, waste heat recovery, consumer goods and more; wherever there is a need for thermal energy storage.

Difference between conventional Eutectic Mixtures

A generic term "eutectics" are also used for referring any mixture of chemical compounds or elements that have a single chemical composition that solidifies at a lower temperature than any other composition made up of the same ingredients. This composition is known as the eutectic composition and the temperature at which it solidifies is known as the eutectic temperature. Whether it is salt water solution, glycol solution or PCMs all are referred to as eutectics; hence there is a need to understand the difference. A eutectic solution to be qualified as a phase change material for the purpose of storage of thermal energy there are some important factors to be considered. Without the consideration of these factors a eutectic solution would find its application as an anti-freeze solution or simply as a sensible heat storage medium at various temperatures.

PCMs are engineered to change their phase (solid to liquid or vice versa) at a specific temperature and one should look at the following three factors to qualify a PCM;



- 1) High thermal storage capacity in the form of latent heat (200KJ/Kg or above)
- 2) Constant temperature maintenance during the release of stored energy.
- 3) Guaranteed repeatability in performance for more than 3000 times.

The benefits of the above features are;

- Precise temperature control allowing not more than +/- 1°C of error.
- Longer duration of retention period – upto 18 hours due to high latent heat.
- Reduction in the overall weight of the freezer due to high energy storage to weight ratio of the PCMs.

Performance of PCM in commercial freezers or coolers

Freezers for ice-creams are designed to maintain a temperature between -18°C to -23°C while beverages are maintained between 2°C to 8°C in a cooler. The PCM chosen for both of these applications are different due to the different temperature requirements. Shown below in figure 2 is an illustration of PCM integration within the walls of the ice-cream freezer. The selected PCM gets charged passively when the power is available within 9-10 hours.

The selection of the PCM is important as one of the critical factor is the minimum temperature that

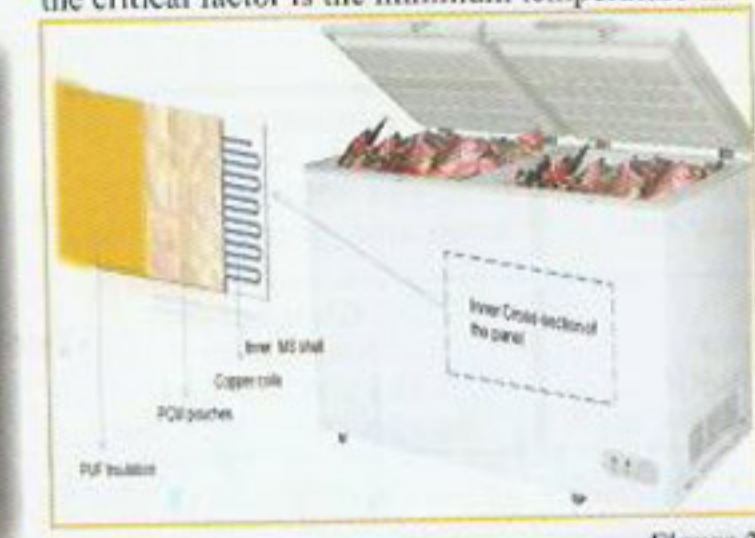


Figure 2

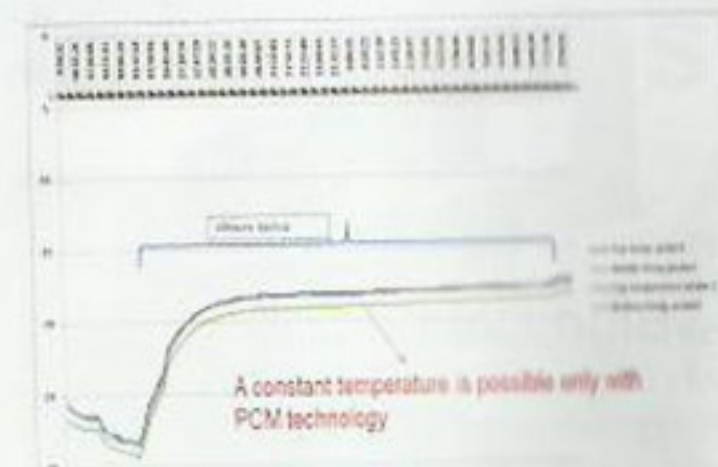


Figure 3

the refrigeration unit can offer to ensure charging is completely done. Once fully charged the PCM is in ready state to release back the energy when there is a power or equipment failure. The figure 3 shows the graph of the temperature inside an empty freezer compartment monitored sensors at various different locations. This freezer is designed to maintain a temperature of -18°C to -19°C for a minimum of 16 hours subjected to an ambient of 40°C and several opening and closing of the lid.

About Pluss Polymers Pvt. Ltd.

A pioneer in advanced Phase Change Materials Technology (PCM), Pluss is the only Indian company engaged in research and indigenous development of PCMs for a wide range temperature requirement with several patents. Pluss is focused in creating value for its customers by designing innovative products and solutions in the field of Specialty Polymers and Phase Change Materials. Pluss PCMs used for providing solutions for energy efficient and reliable temperature controlled storage and transport applications are branded under the registered trademark of savE®. In the US market it is sold under the brand savENRG®. Pluss is a venture funded organization with equity stake being held by Tata Capitals premium innovation fund.



savE®
your product

savE® Phase Change Materials (PCM) technology for Freezers and Transport solution

- Constant and precise temperature control during power outage
- Up to 18 hours of retention
- 25% Reduction in weight of the freezer
- Up to 15% saving on the running cost



Awards & Recognition

- Cold Chain Industry awards 2015 - "cold chain Innovation of the year"
- CII Industrial Innovation award 2014



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